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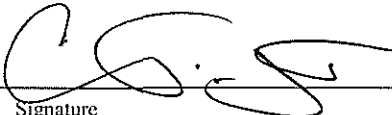
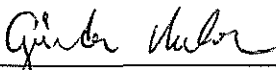


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CALCULATION COVER SHEET

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1. Objectives

A bounding radionuclide inventory for the tungsten of the Los Alamos Neutron Science Center (LANSCE) 1L Target is calculated. Based on the bounding inventory, the dose resulting from the maximum credible incident (MCI) is calculated for the maximally exposed offsite individual (MEOI). The design basis accident involves tungsten target oxidation following a loss of cooling accident. Also calculated for the bounding radionuclide inventory is the ratio to the LANSCE inventory threshold for purposes of inventory control as described in the target inventory control policy [1].

2. Limitations

When calculation use is consistent with the objective there are no limitations associated with this calculation.

3. Acceptance Criteria

Specific acceptance criteria do not exist for this calculation.

4. Methodology

The methodologies of the MCNPX and CINDER'90 codes are used to calculate the bounding radionuclide inventory [2,3].

The MEOI dose is total effective dose equivalent (*TEDE*). It is the sum of the inhalation dose, committed effective dose equivalent (*CEDE*), and the external exposure dose, cloud submersion dose equivalent (*CSDE*). Inhalation dose is the inhalation dose conversion factor in rem/Ci (*DCF_I*) times the activity inhaled. The activity inhaled is the product of the activity concentration in Ci/m³ (χ), the fraction of that concentration that is respirable (*RF*), and the volume of air inhaled. The air volume inhaled is the breathing rate in m³/s (*BR*) times the exposure time, or time spent breathing the concentration, in s (*T_E*). The result is that the inhalation dose is given by

$$CEDE = DCF_I \cdot \chi \cdot RF \cdot BR \cdot T_E. \quad \text{Eq. 1}$$

External exposure dose is the product of the submersion dose conversion factor in rem·m³ per Ci·s (*DCF_S*), the activity concentration in Ci/m³ (χ), and the exposure time, or time spent immersed in the concentration, in s (*T_E*). The result is that the submersion external exposure dose is given by

$$CSDE = DCF_S \cdot \chi \cdot T_E. \quad \text{Eq. 2}$$

Summing the inhalation and external exposure doses and factoring out common terms gives

$$TEDE = \chi \cdot T_E \cdot (DCF_I \cdot RF \cdot BR + DCF_S). \quad \text{Eq. 3}$$

The normalized dispersion factor $\chi/\dot{Q}$ is the ratio of the concentration to the release rate. It has units of s/m³ and is an input to this calculation. See assumptions below. It relates the concentration at a defined location to the rate the source term (*ST*) in Ci is being released. If the source term is released uniformly over the release duration in s (*T_R*) the release rate is

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$$\dot{Q} = \frac{ST}{T_R}. \quad \text{Eq. 4}$$

Multiplying both sides of Equation 4 by $\chi/\dot{Q}$ gives

$$\chi = \frac{ST}{T_R} \cdot \chi/\dot{Q}. \quad \text{Eq. 5}$$

Substituting Equation 5 into Equation 3 yields

$$TEDE = ST \cdot \chi/\dot{Q} \cdot \frac{T_E}{T_R} \cdot (DCF_I \cdot RF \cdot BR + DCF_S). \quad \text{Eq. 6}$$

The source term is the product of the material at risk (*MAR*) and factors including the damage ratio (*DR*), airborne release fraction (*ARF*) and the leak path factor (*LPF*). That is

$$ST = MAR \cdot DR \cdot ARF \cdot LPF. \quad \text{Eq. 7}$$

Substituting Equation 7 into Equation 6 gives

$$TEDE = MAR \cdot DR \cdot ARF \cdot LPF \cdot \chi/\dot{Q} \cdot \frac{T_E}{T_R} \cdot (DCF_I \cdot RF \cdot BR + DCF_S). \quad \text{Eq. 8}$$

Equation 8 does not account for the fact that each radionuclide in the inventory is a *MAR*, and that each may have a different *DCF_I*, *DCF_S*, *RF*, *DR*, *ARF* and *LPF*. Noting this, *TEDE* is really the sum over all *MAR_i* as follows

$$TEDE = \chi/\dot{Q} \cdot \frac{T_E}{T_R} \cdot \sum_i MAR_i \cdot DR_i \cdot ARF_i \cdot LPF_i \cdot (DCF_{I,i} \cdot RF_i \cdot BR + DCF_{S,i}). \quad \text{Eq. 9}$$

As required for implementation of the inventory control policy the ratio of the 1L Target bounding inventory to the LANSCE inventory threshold is calculated as a sum-of-fractions of the policy threshold activities (*TA_i*). That is the threshold ratio (*TR*) is the sum of the ratios of the *MAR_i*'s to the *TA_i*'s expressed as

$$TR = \sum_i \frac{MAR_i}{TA_i}. \quad \text{Eq. 10}$$

5. Assumptions

The MCI for the 1L Target is a loss of coolant to the tungsten targets with a concurrent failure of redundant active devices that would normally terminate beam delivery upon loss of coolant flow. What would occur in these accident circumstances is that the tungsten would heat to above the threshold for oxidation and vaporization in the presence of air and steam. The oxidized material including the radionuclide inventory could spread throughout the crypt vacuum vessel. Hydrogen is also produced in the chemical reaction that is attacking the tungsten during the event. Hydrogen detonation is not credible but its burning may cause small pressure fluctuations that provide a motive force for driving oxidized target material from the crypt vacuum vessel into the target cell above the seal plate [4]. Figure 1 illustrates the crypt vacuum vessel configuration. Target cell ventilation is through HEPA filters and is exhausted through a 22-meter tall stack.

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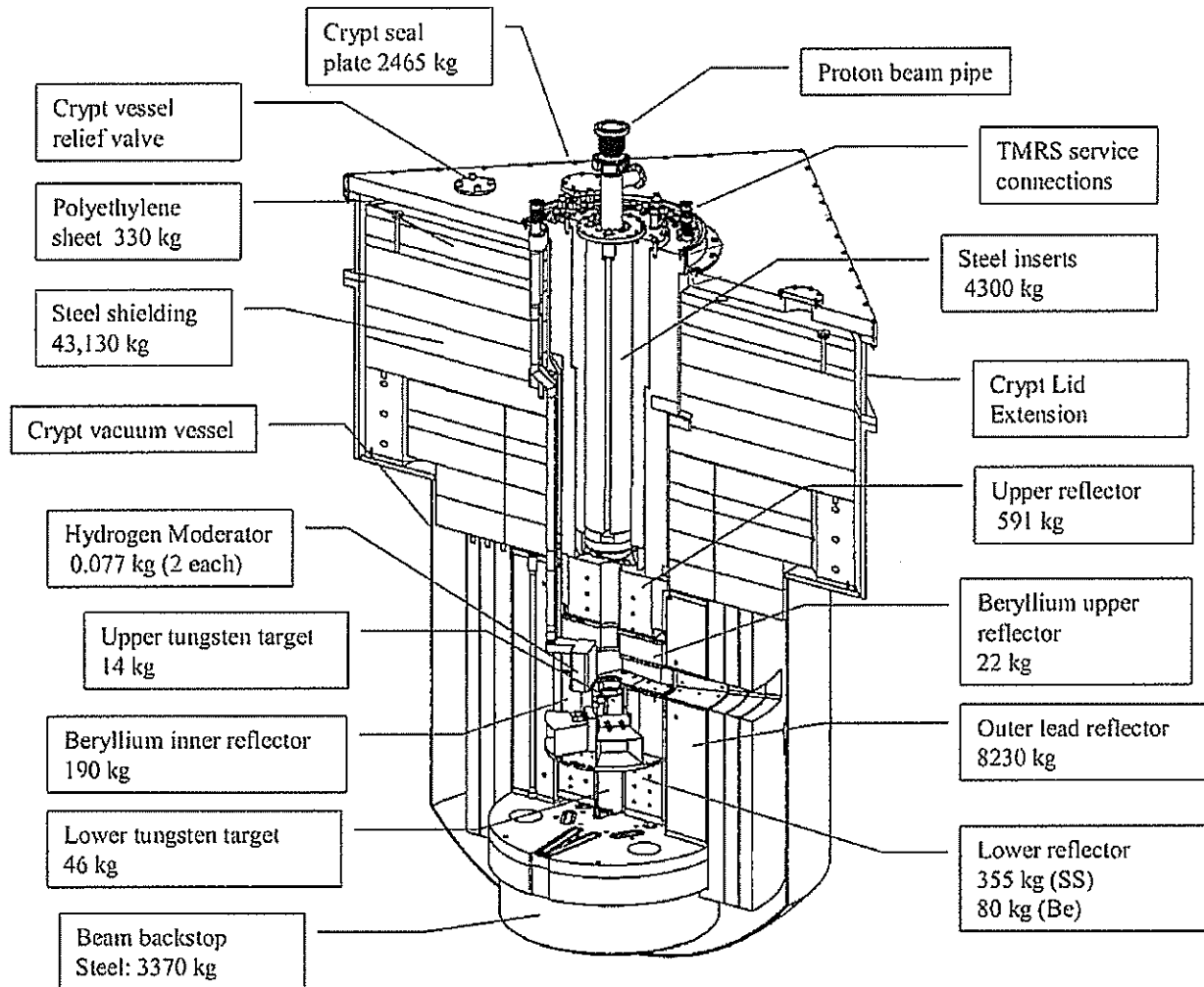


Figure 1: Mark 2 Target-Moderator-Reflector-System (TMRS)
and Surrounding Cryot Vacuum Vessel Components

5.1 Inventory Calculation Assumptions

The bounding radionuclide inventory is calculated assuming continuous 800 MeV proton beam delivery to the 1L Target at 200 μA for 521 days. This is an integrated beam current of 2500 mA·h. Because the inventory builds up over time and the target is operated less than continuously, at less than the maximum allowed current, the maximum credible incident MEOI dose calculated using the bounding inventory could only be approached after years of operation (but never achieved due to varying rates of radioactive decay).

5.2 Dose and Threshold Ratio Calculation Assumptions

5.2.1 Dispersion Factor ($\chi/\dot{Q}$)

The Lab's Safety Basis Office has calculated dispersion factors for the MEOI from releases originating in various LANSCE facilities using the MACCS2 and POSTMAX codes [5]. Dispersion factors were

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calculated with and without heating from fire that results in plume rise and lower values. For this calculation the unheated case is assumed for which the dispersion factor is $5.90\text{E-}04 \text{ s/m}^3$ for release durations greater than one minute. Based on site meteorological history the dispersion factor for the MEOI was this value or lower 95 percent of the time. It also conservatively assumes a ground level release and with no building wake effect, plume meander or deposition.

5.2.2 Exposure Time (T_E) and Release Duration (T_R)

The beam is the heating source that raises tungsten temperature to the point it may be vaporized in a steam environment. Due to the fact that it is a chemical reaction occurring on the hot tungsten surfaces that vaporizes the material it does not occur instantaneously. At a minimum it will take 13.7 hours to completely vaporize the upper target. At more than three times the mass with a lower surface area to volume ratio, it would take even longer to react the lower target. The MEOI dose is most conservatively calculated by assuming that $T_E = T_R = 13.7$ hours, noting that $T_E = 2$ hours is prescribed in DOE-STD-3009-94 [6].

5.2.3 Material at Risk (MAR_i)

The MAR_i are the radionuclide activities obtained from the MCNPX-CINDER'90 inventory calculation. See Section 5.1, Inventory Calculation Assumptions. They are the totals both the upper and lower targets at the end of irradiation.

5.2.4 Damage Ratio (DR_i)

It is assumed that both the upper and lower targets are entirely vaporized in the MCI. A damage ratio of one is therefore used for all radionuclides in the dose calculation. This is most likely a conservative assumption. At the maximum beam current, $200 \mu\text{A}$, the lower target will not actually reach the temperature required for the tungsten to vaporize, about 800°C , since beam terminates in about 2.5 minutes due to beam window failure causing the beamline vacuum to be lost. Two and one-half minutes is the time it takes for the window to reach the Inconel melting point when flow is lost [7]. Failure would actually occur sooner since before reaching the melting point Inconel would lose its strength and start to crack. The lower target inventory is assumed to be at risk since lower beam currents were not analyzed. At a lower beam current less heating occurs and it will take longer to melt the window, and though temperatures in the tungsten are rising more slowly, the analyses that have been performed do not provide a basis for concluding that under lower current scenarios the lower target can never reach the threshold for oxidation.

5.2.5 Airborne Release Fractions (ARF_i) and Respirable Fractions (RF_i)

The ARF_i and RF_i are the crux of the MEOI dose calculation and determining reasonable and conservative values is critical. In order to define a meaningful scenario the release is defined as being from the target cryo vacuum vessel. It is driven by the pressure pulses from burning hydrogen.

Experiments conducted at Brookhaven National Laboratory indicate that in an air-steam environment most of the reacted tungsten will form a scale on the reaction surfaces [8]. This scale is expected to impede the reaction. Much of the aerosolized tungsten, 70 percent or more, in the experiments plated out on hot surfaces and condensed on cool ones relatively close to the reacting tungsten. Beyond the 3.5-foot transport path in the experimental apparatus the aerosol was a fine dry powder. Figure 2 is a photograph showing the aerosol exiting the experimental apparatus and settling in a beaker. Like the experimental apparatus there will be hot target components and cool surroundings through which the aerosolized material must pass. Cooling for the water moderators and reflectors is independent of the system that cools the targets and beam window.

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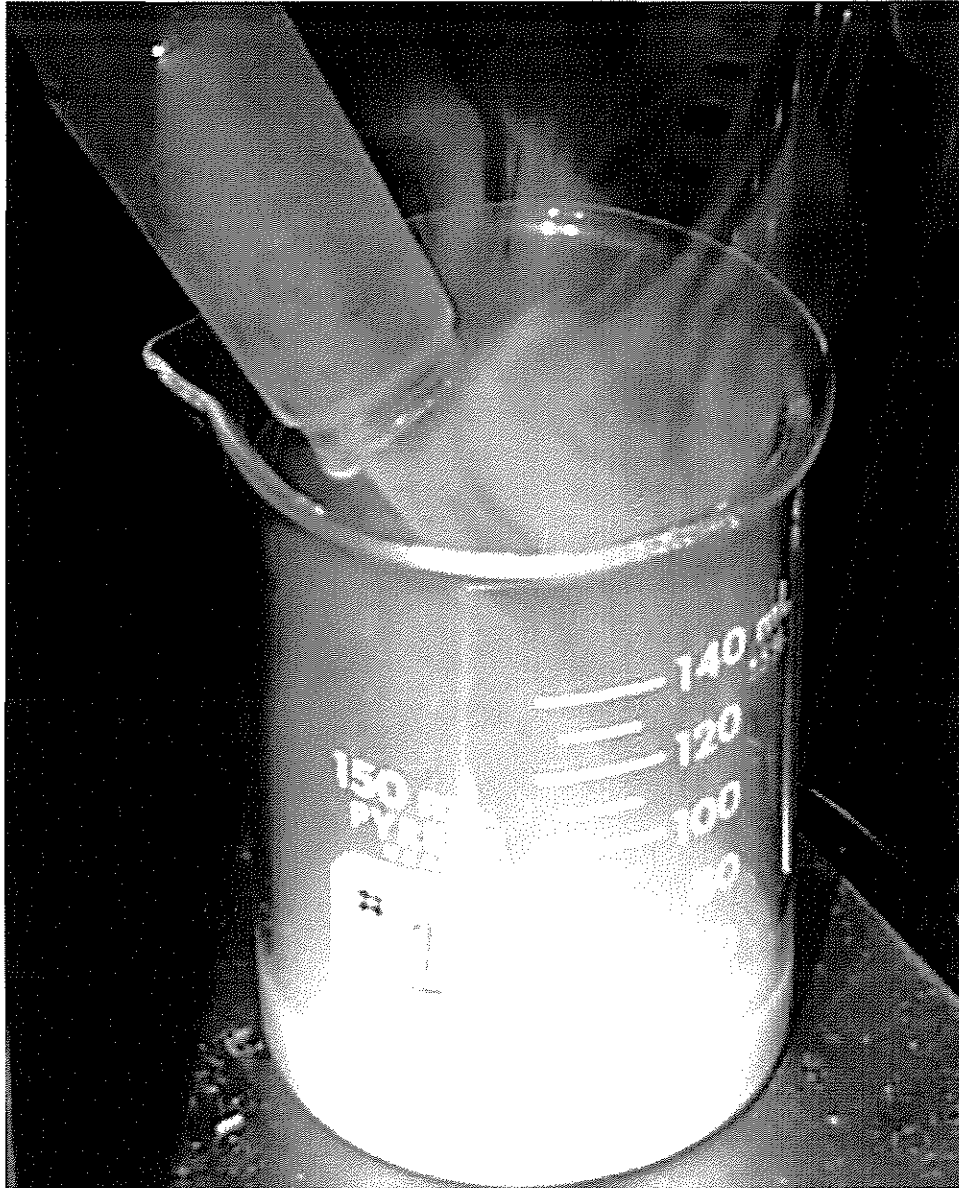


Figure 2: Photograph of Tungsten Oxide Aerosol Exiting Experimental Apparatus
(copied from Reference 8)

The path to the seal plate following the gaps between TMRS components inside the vacuum vessel is much longer with many more bends than the experiments considered, 3.5 feet with one bend. There is a 2-inch gap between the seal plate and the top of the bulk shielding inside the vessel. Once the oxidized target material reaches this gap it may be forced out the relief valve by pressure pulses from burning hydrogen. Because the path to the gap is much more arduous than the experiments modeled, much less than the entire aerosolized target inventory will make its way into the gap. Conservatively it is assumed that it does, and that the pressure pulses from burning hydrogen act on it forcing it out the relief valve. The maximum pressure calculated for a hydrogen burn in the 1L Target vacuum vessel is 18.3 psig.

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DOE-STD-3010-94 assesses a bounding airborne release fraction of $5E-3$ and a respirable fraction of 0.4 for venting of pressurized powders, or the venting of pressurized gasses through powders, at 25 psig or less [9]. This is based in part on experiments using the apparatus shown in Figure 3 [10]. Air was rapidly forced in through the inlet until the rupture disk broke. The aerosol was collected and analyzed to determine airborne release and respirable fractions. The aerosols produced had median diameters of several microns. The primary particles produced by tungsten vaporization have an average diameter of about 0.1 microns but due to agglomeration the aerosols are characterized by much larger particle sizes [11]. In the experiment where this was measured heated tungsten was reacted in air and steam environments and particle sizes one foot from a reaction specimen were measured after the aerosol passed through a 0.5-inch diameter tube. In this short distance the agglomerated particles had diameters up to 25 microns and the mass median diameter of the aerosols were about one micron. It is reasonable to expect that this is characteristic of the powder being collected in the beaker in Figure 2, and that with a much longer path to travel, the powder subject to being released in the 1L Target MCI will have somewhat larger particles. For these reasons though the primary particle size is small for tungsten oxidation, agglomeration will result in particles with sizes reasonably consistent with the experiments upon which the DOE-STD-3010-94 bounding airborne release and respirable fractions were based.

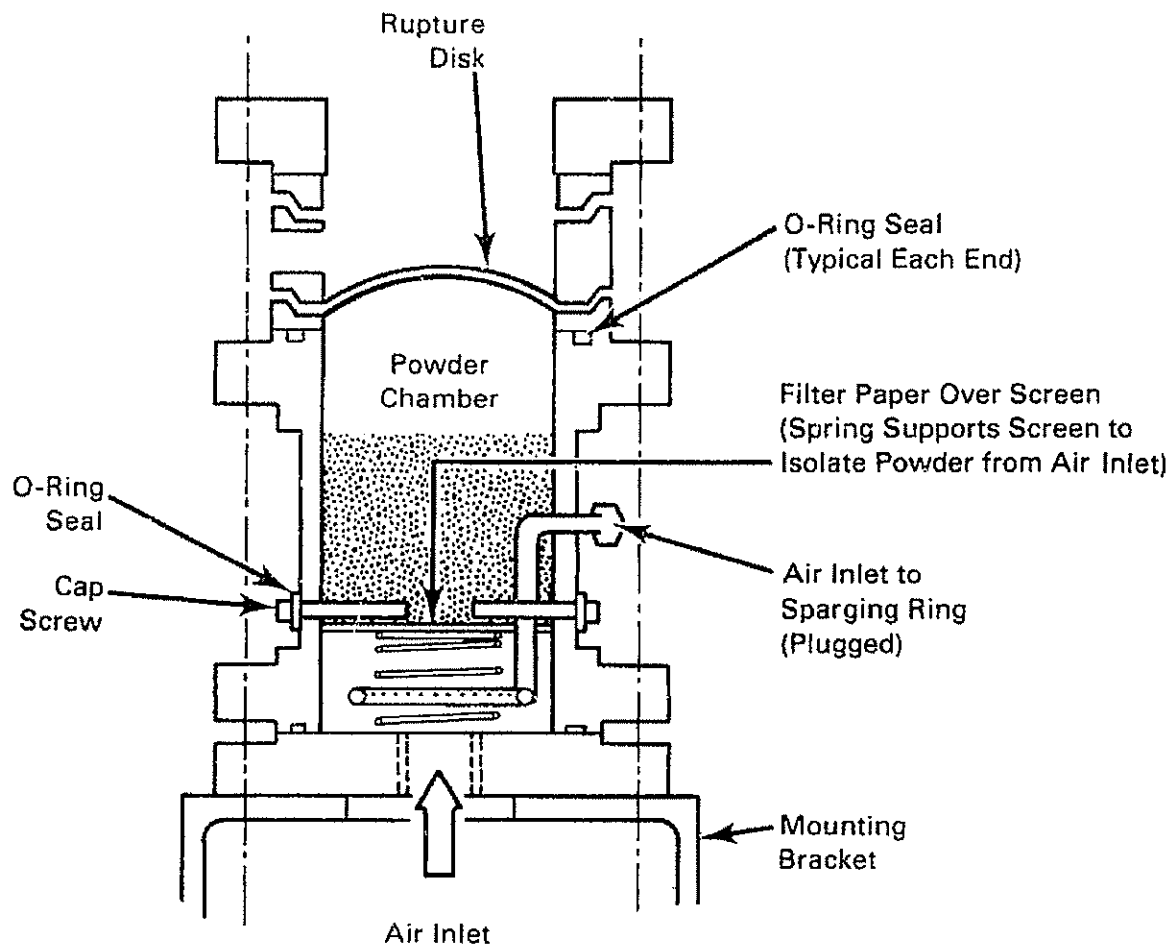


Figure 3: Pressurized Airborne Release Equipment (PARE) Configured for Low Pressure Power Releases (copied from Reference 10)

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The DOE-STD-3010-94 airborne release fraction of $5\text{E-}3$ and a respirable fraction of 0.4 are assumed for all elements in the inventory except noble gasses. It is reasonable to expect that products of all reactive elements will adhere to and transport with the much, much greater tungsten reaction product mass. For noble gasses however airborne release and respirable fractions are assumed to be one.

An independent analysis of what might be released from the crypt vacuum vessel has been performed [12]. This analysis alternately considered aerosolization of the tungsten to be the release and evaluated a transmission factor based on transport mechanisms to describe what fraction of the release could escape the crypt. The conclusion was that ten percent of the material is aerosolized with a respirable fraction of one, but the crypt leak path factor is $1\text{E-}4$. The product of these terms is $1\text{E-}5$. The product is $2\text{E-}3$ based on DOE-STD-3010-94 low-pressure powder release parameters where a crypt vacuum vessel leak path factor of one is conservatively assumed. The independent analysis indicates that this evaluation is likely conservative by a factor of 200. It also concludes that assuming all radionuclides in the inventory behave as tungsten is appropriate.

5.2.6 Leak Path Factors

A leak path factor of 1.0 is conservatively assumed for all elements in the inventory. See Section 5.2.5 for more information.

5.2.7 Inhalation Dose Conversion Factors ($DCF_{I,i}$)

The activity-to-dose conversion factors of FGR-11 as listed in the LANSCE target radionuclide inventory control policy are assumed [1,13]. The Laboratory's hazard analysis procedure presently provides for the use of the ICRP-30 conversion factors as conveniently listed in FGR-11 rather than requiring more involved analysis based on ICRP-72 age-dependent dosimetry [14]. The dose conversion factors listed in the policy are for lung clearance classes applicable to analysis of oxidized materials. Inhalation doses for radionuclides in the inventory for which no dose conversion factors are listed in FGR-11 are assumed to be negligible. The validity of this assumption is investigated in Section 8, Results.

5.2.8 Breathing Rate

As directed by NNSA/LASO a breathing rate of $3.47\text{E-}4 \text{ m}^3/\text{s}$ is assumed per the Laboratory's hazard analysis procedure [14].

5.2.9 Submersion Dose Conversion Factors ($DCF_{S,i}$)

FGR-12 activity concentration-to-dose rate conversion factors for immersion in semi-infinite radioactive clouds as listed in the LANSCE target radionuclide inventory control policy are assumed [1,15]. Submersion doses for radionuclides in the inventory for which no dose conversion factors are listed in FGR-12 are assumed to be negligible. The validity of this assumption is investigated in Section 8, Results.

5.2.10 Threshold Activities (TA_i)

The radionuclide thresholds are the threshold activities listed in Attachment 1 of the LANSCE target radionuclide inventory control policy [1].

6. Design Inputs

The spallation physics team at LANSCE maintains a computational model of the Mark II 1L target-moderator-reflector system (TMRS) for MCNPX input. The model was written based on detailed engineering drawings. The TMRS engineering model has been validated for proton-neutron transport calculations with measurements of energy dependent neutron flux on various flight paths [16]. It is this

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model that is used for the radionuclide inventory calculation. Figure 4 is an elevation cross section of the TMRS insert from the model. The MCNPX model is the design input for the inventory calculation.

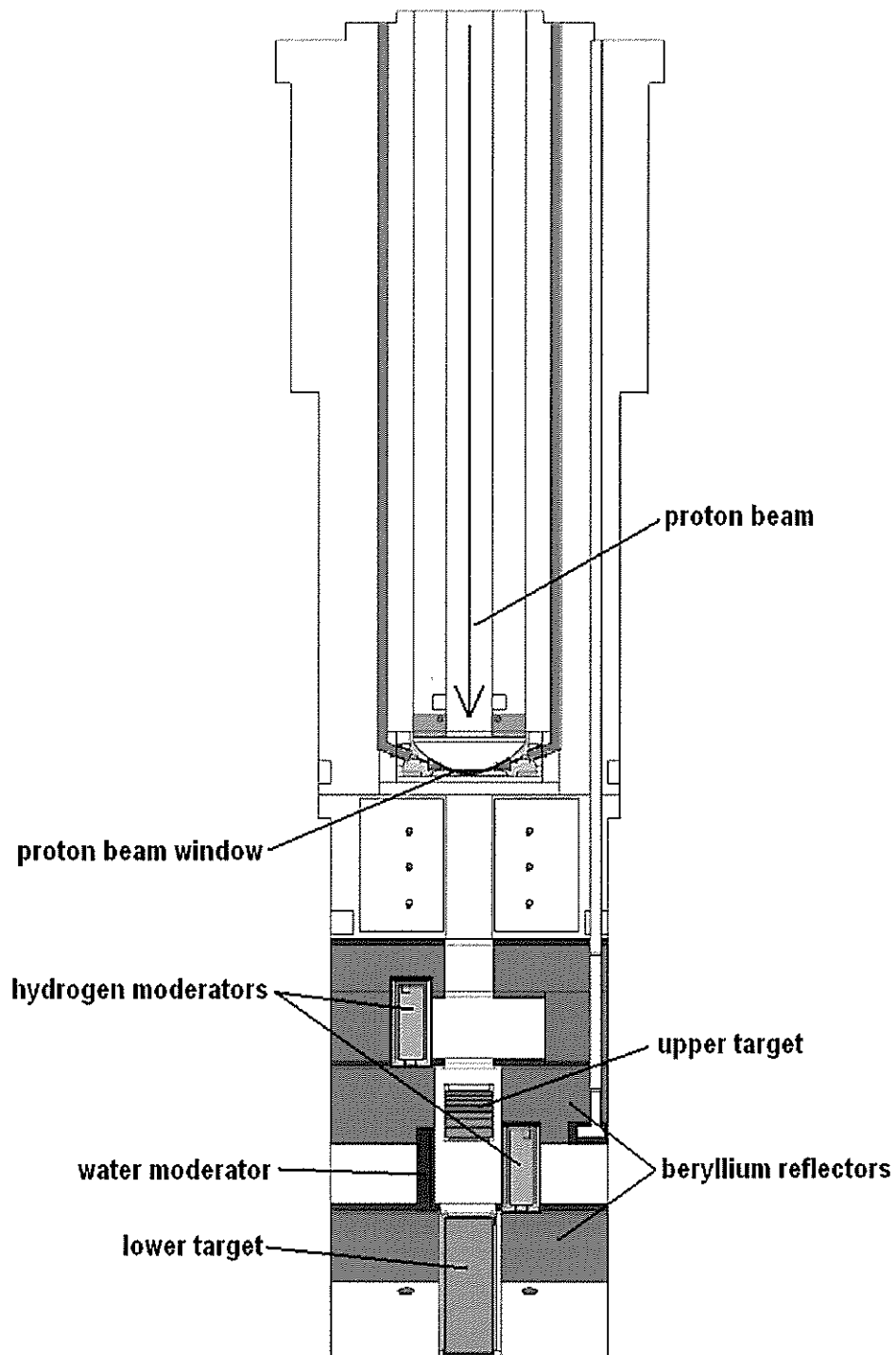


Figure 4: Mark 2 TMRS Insert MCNPX Model

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The design parameters to which the inventory calculations are most sensitive are the tungsten target and proton beam dimensions. These parameters are important for accurately calculating spallation product yields from beam protons and high-energy neutrons, as well as the low energy neutron fluxes in the tungsten. The inclusion of moderators and reflectors in the model is also important to the calculation of low energy neutron fluxes in the tungsten but the inventory calculation is not as sensitive to moderator-reflector dimension details as it is to target details. The MCNPX calculated spallation product yields and low energy neutron fluxes are both inputs to the CINDER'90 transmutation calculation.

The tungsten in the upper and lower targets is 4.004 inches in diameter. The upper target consists of seven plates with a total combined thickness of 3.545 inches. The lower target consists of a single tungsten cylinder 11.75 inches long. The modeled tungsten masses are 1.41175E+04 grams in the upper target and 4.67929E+04 grams in the lower target. The modeled proton beam cross section has a radius of 5 cm in which the proton density has a Gaussian spatial distribution with $\sigma_x = \sigma_y = 1.5$ cm. This is the nominal operating beam spot.

7. Calculation

7.1 Radionuclide Inventory Calculation

The radionuclide inventory in tungsten of the 1L Target is calculated using the MCNPX and CINDER'90 codes. MCNPX is a Monte Carlo radiation transport code. CINDER'90 is a transmutation code. The radiation transport calculation is run to determine spallation product yields and neutron fluxes below 25 MeV. These results are input to the transmutation code along with input describing the time dependence of beam delivery to the target. For the bounding radionuclide inventory this is continuous, uninterrupted beam delivery at the design current limit of 200 μ A out to the end of the estimated serviceable life of the target at 2500 mA·h.

For the MCNPX calculations proton beam entering the TMRS is defined as the source and spallation product yields and neutron fluxes below 25 MeV are calculated. Two MCNPX input decks are prepared. They both are edits of the Mark II engineering model. The first is the deck to write the history tape from which spallation yields are computed with the HTAPE3X postprocessor included in the MCNPX code distribution. Since only physics model events are written to the tape, the use of evaluated cross section data tables is restricted to neutron transport below 25 MeV using appropriate entries on PHYS data cards. This is necessary since CINDER'90 only calculates radionuclide production rates from neutrons below 25 MeV and thus requires that radionuclide production rates from high-energy neutrons and other particles at all energies be generated by the physics model. The second input deck tallies the neutron fluxes below 25 MeV in the tungsten target volumes using evaluated cross sections for both protons and neutrons wherever they are defined and the physics model elsewhere. This provides a more accurate low energy neutron flux calculation than would be obtained if the tallies were included in the history tape input. The default physics model options are used. The particle types tracked are protons, neutrons, and charged pions.

A Perl script to run CINDER'90 for activation problems has been developed [17]. It reads a user input file describing the assumed proton beam history and the MCNPX neutron flux tally output file, runs HTAPE3X on the history tape, prepares all of the necessary CINDER'90 user inputs, and then executes CINDER'90. This script is used for the 1L Target inventory calculation. A cross section update based on a revised evaluation for $^{148}\text{Gd}(n,\gamma)$ is used [18]. The revised evaluation considered recent cross section measurements and the update improves the accuracy of the depletion calculation for ^{148}Gd , the most radiologically significant nuclide in the inventory. Measurements show that MCNPX default physics closely predicts, overestimating by a few percent, the cumulative production cross section for ^{148}Gd [19]. It is generally accepted that when used to calculate mean quantities such as total activity, MCNPX-

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CINDER'90 errors are about 20 percent [20]. Comparisons of measured and calculated inventories indicate that individual radionuclide concentrations are predicted to within a factor of two about 50 percent of the time [20,21]. The experiments indicate that for 800 MeV protons on tungsten, CINDER'90 is generally overestimating radionuclide concentrations suggesting that error is on the conservative side.

The activation script input generates two runs. The first calculates the upper target inventory and the second calculates the lower target inventory. The ALLCODE program included with CINDER'90 combines the inventories. The combined inventory at the end of the modeled irradiation history is input to the MEOI dose calculation. A shell script was written to build a CSV file listing radionuclide activities at the end of each time step for input to subsequent spreadsheet calculations. This script as well as all inputs and outputs for the inventory calculation are included on the CD accompanying this calculation note.

7.2 MEOI Dose Calculation

A Microsoft Excel workbook is used to calculate the MEOI dose from the bounding radionuclide inventory using Equation 9. The spreadsheet calculations impose all of the assumptions described in Section 5.2. The worksheet listing all of the calculated radionuclide activities and the respective MEOI doses is in Appendix 1. Also listed in the appendix are the dose conversion factors from the inventory control policy. A copy of the spreadsheet is included on the CD accompanying this calculation note.

7.3 Threshold Ratio Calculation

The same Microsoft Excel workbook used to calculate the MEOI dose is used to calculate the threshold ratio for the bounding radionuclide inventory using Equation 10. The spreadsheet calculations impose the assumptions described in Section 5.2. The worksheet listing all of the calculated radionuclide activities and the respective threshold fractions is in Appendix 1. Also listed in the appendix are the threshold activities from the inventory control policy. A copy of the spreadsheet is included on the CD accompanying this calculation note.

As a check that the end of irradiation activities are correctly imported to the spreadsheet calculations, the threshold ratio is independently calculated by the ALLCODE program. The ALLCODE program does a sum-of-fractions threshold ratio calculation based on user input threshold activities. The DOE-STD-1027-92 hazard category 3 threshold activities in the input file supplied with CINDER'90 are replaced with the LANSCE inventory control policy's threshold activities for this calculation.

8. Results

Appendix 1 lists the activities for all radionuclides produced in the inventory calculation. There are 1,764. The total activity in the inventory is 205,000 Ci. The LANSCE inventory control threshold ratio is 132. 674 of the radionuclides have dose conversion factors listed in FGR-11 and/or FGR-12. The MEOI dose for the MCI is 213 mrem based on the 674 radionuclides. Dose conversion factors for remainder of inventory are assumed to all be zero in Equation 10. The ¹⁴⁸Gd dose is 39 percent of the total. The noble gas dose is 0.36 percent of the total.

In order to ascertain the significance of radionuclides without FGR-11 and FGR-12 dose conversion factors, an approximation of the relative radiological significance of the inventory without dose conversion factors is made by first defining parameters that are proportional to the internal and external radiation hazards. For internal exposure to a radionuclide the parameter is the product of the number of decays during the commitment period, 50 years, and the quality factor weighted total energy per decay. For external exposure the parameter is the product of the number of decays while the plume passes the receptor, assumed to be the 13.7-hour minimum time required to release the target, and the mean gamma energy per decay. These parameters are expressed as

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$$P_{I,i} := \frac{A_i}{\lambda_i} (1 - e^{-\lambda_i(50 \text{ years})}) (E_{\beta,i} + E_{\gamma,i} + 20 E_{\alpha,i}) \quad \text{Eq. 11}$$

and

$$P_{S,i} := \frac{A_i}{\lambda_i} (1 - e^{-\lambda_i(13.7 \text{ hours})}) E_{\gamma,i} \quad \text{Eq. 12}$$

where

$P_{I,i}$ = quantity proportional to inhalation exposure hazard (MeV),

$P_{S,i}$ = quantity proportional to submersion exposure hazard (MeV),

i = radionuclide index,

A_i = radionuclide activity (Ci),

λ_i = decay constant (s^{-1}),

$E_{\beta,i}$ = mean beta energy emitted per decay (MeV),

$E_{\gamma,i}$ = mean gamma energy emitted per decay (MeV), and

$E_{\alpha,i}$ = mean alpha energy emitted per decay (MeV).

Figure 5 presents plots of $P_{I,i}$ and $P_{S,i}$ versus $A_i DCF_{I,i}$ and $A_i DCF_{S,i}$ respectively for the radionuclides with FGR-11 and FGR-12 dose conversion factors. The slopes of the plotted lines are calculated as $A_i DCF_{I,i}$ and $A_i DCF_{S,i}$ weighted sums of the ratios $P_{I,i} : A_i DCF_{I,i}$ and $P_{S,i} : A_i DCF_{S,i}$. They are $m_I = 2.46E+13$ for inhalation and $m_S = 6.72E+15$ for submersion. The individual ratios are within a factor of ten of these slopes about 60 percent of the time for inhalation and 80 percent of the time for submersion. Using the slopes approximate dose conversion factors can be calculated for all 1,764 radionuclides in the inventory using

$$DCF_{I,i} \cong m_I \cdot A_i \cdot P_{I,i} \quad \text{Eq. 13}$$

and

$$DCF_{S,i} \cong m_S \cdot A_i \cdot P_{S,i}. \quad \text{Eq. 14}$$

Using the approximate dose conversion factors calculated using Equations 13 and 14 yields a MEOI dose of 217 mrem if only the 674 radionuclides with FGR-11 and FGR-12 dose conversion factors are considered. This agrees well with the 213 mrem result obtained with the FGR-11 and FGR-12 factors. Equations 13 and 14 are not approximating individual radionuclide doses with any remarkable accuracy since differences in biological behavior of the elements are not accounted for. However, averaged over virtually all the elements of atomic numbers equal or less than tungsten as are produced in spallation the approximations are reasonable for the total dose calculation. Using the approximate dose conversion factors for all 1,764 radionuclides in the inventory the MEOI dose is 220 mrem. This indicates that including dose from the 1,090 radionuclides without FGR-11 and FGR-12 dose conversion factors would increase the dose by something on the order of a percent. And considering the conservatisms in the underlying assumptions for the MEOI dose calculation, dose from radionuclides without FGR-11 and FGR-12 dose conversion factors can reasonably be neglected.

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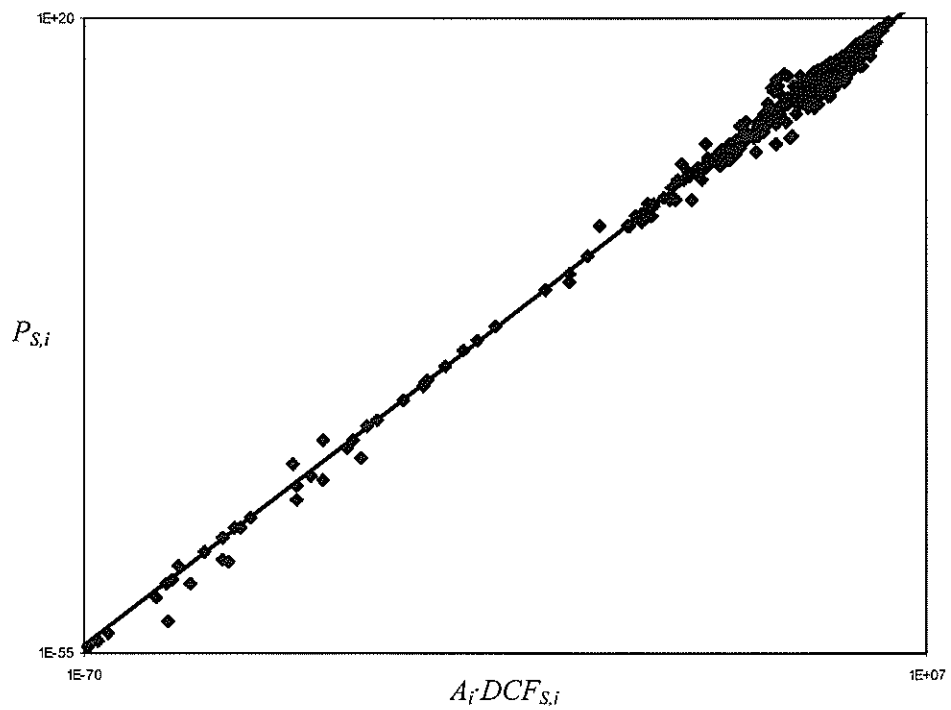
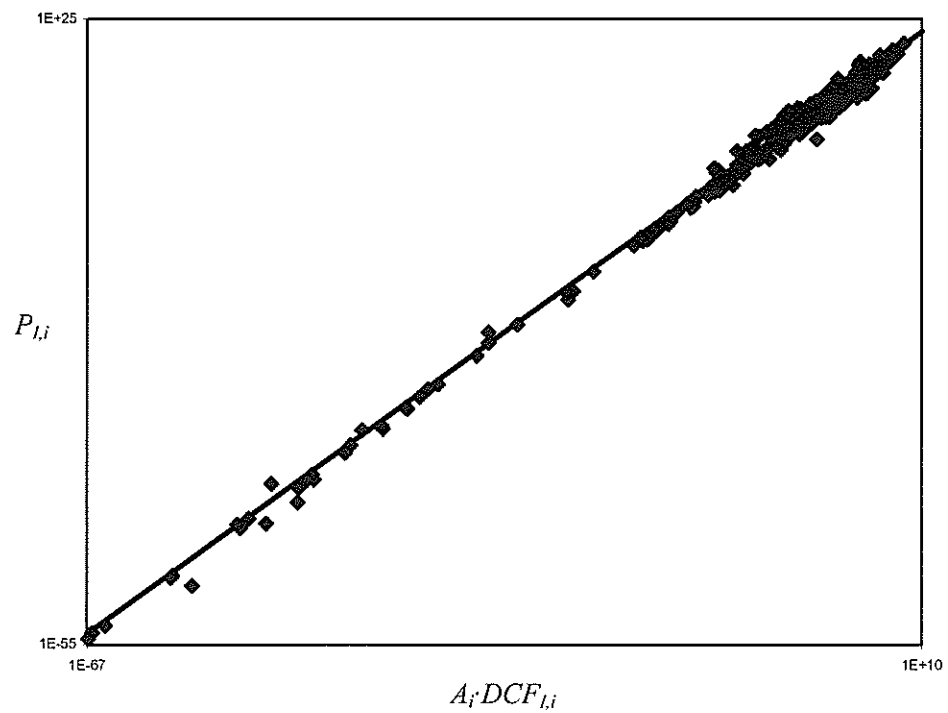


Figure 5: $P_{l,i}$ versus $A_i DCF_{l,i}$ and $P_{s,i}$ versus $A_i DCF_{s,i}$

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9. Conclusions

A bounding radionuclide inventory calculation for the 1L Target was completed using the MCNPX and CINDER'90 codes. Continuous beam delivery at 200 μ A to 2500 mA·h was assumed. The total calculated activity following this irradiation period is 205,000 Ci. The dose to the MEOI from the MCI is 213 mrem for the bounding inventory. The LANSCE inventory control threshold ratio is 132.

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11. Computer Specifications

11.1 Software Specifications

The MCNPX code version used for these calculations was 2.5.0, dated March 21, 2005. This version is presently the most recent production version of the code available through the Radiation Safety Information Computational Center (RSICC). The precompiled PGI Linux executables were run. These were tested on the workstation used to run the inventory calculations using the distribution's test script. The BERTIN library from the RSICC distribution was used but PHTLIB was recompiled for the inventory calculation from the SPEC1 nuclear structure library with g77 version 3.2.3. Use of the new library is recommended for radionuclide inventory calculations because it improves the estimate of nuclide production appearing in metastable states [22].

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The CINDER'90 code version used was 06.2, dated September 11, 2006. The library version used was 06.1, dated February 20, 2006, with the $^1\text{H}(n,\gamma)$ cross section update included with the code distribution. These are the presently the latest releases from the Theoretical Division's Nuclear Physics Group (T-16). These versions are in the process of being packaged with the activation script and a set of test problems for RSICC distribution. The CINDER'90 programs were compiled with g77 version 3.2.3. The activation script version used for these calculations was 0.5, dated October 2, 2007. The script and executables were tested on the workstation used to run the inventory calculation in accordance with the requirements of the software quality management plan [23]. There were no differences between the output files produced and the quality assurance output files.

The spreadsheet calculations were performed with Microsoft Excel 2000 (9.0.6926 SP-3).

11.2 Workstation Specifications

MCNPX, CINDER'90 and shell and Perl scripts were run on a HP ProLiant ML350 server with Linux version 2.4.21-50.ELsmp. The command shell was tcsh version 6.12.00. The Perl version was 5.8.8.

Microsoft Excel was run on a Dell Precision 360 with Microsoft Windows XP Professional, version 2002, service pack 2.

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APPENDIX 1
Bounding Radionuclide Inventory for the 1L Target

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
totals		2.05E+05		1.32E+02			2.13E-01
H 3	3.89E+08	2.95E+02	5.63E+04	5.25E-03	6.40E+01	1.22E-06	7.74E-06
H 4	1.00E-08	1.41E-11					
He 5	7.60E-22	3.22E-08					
He 6	8.07E-01	1.69E-02					
He 7	3.00E-21	9.43E-08					
He 8	1.19E-01	3.37E-02					
Li 5	3.00E-22	2.49E-11					
Li 8	8.40E-01	2.83E-02					
Li 9	1.78E-01	1.69E-02					
Li 10	1.00E-08	2.03E-08					
Li 11	8.75E-03	1.69E-02					
Be 7	4.61E+06	4.84E-12	1.04E+04	4.65E-16	3.21E+02	8.73E-03	7.60E-19
Be 8	7.00E-17	5.41E-02					
Be 10	4.77E+13	5.35E-08	1.02E+01	5.27E-09	3.54E+05	4.14E-05	7.77E-12
Be 11	1.38E+01	1.86E-03					
Be 12	2.15E-02	1.69E-02					
Be 14	4.35E-03	1.69E-02					
B 9	8.00E-19	1.69E-02					
B 12	2.02E-02	1.69E-02					
B 13	1.73E-02	3.34E-02					
B 14	1.25E-02	2.03E-04					
B 15	9.87E-03	5.06E-02					
C 9	1.27E-01	1.69E-02					
C 10	1.93E+01	3.37E-02					
C 11	1.22E+03	9.69E-09	6.75E+03	1.43E-12	1.22E+01	1.81E-01	5.22E-15
C 14	1.80E+11	1.41E-05	1.73E+03	8.17E-09	2.09E+03	8.29E-07	1.20E-11
C 15	2.45E+00	3.04E-03					
C 16	7.47E-01	1.69E-02					
C 18	9.20E-02	5.06E-02					
N 13	5.98E+02	5.06E-02	6.89E+03	7.34E-06	0.00E+00	1.81E-01	2.71E-08
N 16	7.13E+00	3.58E-04					
N 17	4.17E+00	1.59E-02					
N 18	6.22E-01	3.47E-02					
N 19	2.71E-01	6.75E-02					
O 13	8.90E-03	1.69E-02					
O 15	1.22E+02	6.75E-02	6.88E+03	9.81E-06	0.00E+00	1.82E-01	3.62E-08

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
O 19	2.65E+01	3.06E-02					
O 20	1.35E+01	5.06E-02					
O 21	3.42E+00	7.41E-13					
O 22	2.25E+00	1.35E-01					
F 17	6.45E+01	1.69E-02					
F 18	6.59E+03	1.69E-02	5.94E+03	2.84E-06	8.36E+01	1.81E-01	9.60E-09
F 20	1.12E+01	1.69E-01					
F 21	4.16E+00	6.75E-02					
F 22	4.23E+00	1.86E-01					
F 23	2.23E+00	5.06E-02					
F 24	4.00E-01	5.06E-02					
Ne 18	1.67E+00	1.69E-02					
Ne 19	1.72E+01	1.60E-08	6.87E+03	2.33E-12	0.00E+00	1.82E-01	1.72E-12
Ne 23	3.72E+01	1.53E-01					
Ne 24	2.03E+02	1.33E-01					
Ne 25	6.02E-01	1.18E-01					
Ne 26	1.97E-01	1.18E-01					
Na 21	2.25E+01	2.88E-02					
Na 22	8.21E+07	2.13E-02	4.09E+02	5.20E-05	7.66E+03	4.00E-01	9.18E-08
Na 24	5.39E+04	2.35E-01	1.02E+03	2.30E-04	1.21E+03	8.07E-01	6.74E-07
Na 24*	2.02E-02	3.38E-02					
Na 25	5.91E+01	2.19E-01					
Na 26	1.08E+00	1.35E-01					
Na 27	3.01E-01	1.01E-01					
Na 28	3.05E-02	6.75E-02					
Na 29	4.49E-02	6.75E-02					
Na 30	4.84E-02	3.37E-02					
Na 31	1.70E-02	3.37E-02					
Na 32	1.29E-02	1.69E-02					
Na 34	5.50E-03	1.69E-02					
Mg 21	1.22E-01	1.69E-02					
Mg 23	1.13E+01	5.06E-02					
Mg 27	5.67E+02	1.35E-01					
Mg 28	7.53E+04	2.20E-01	6.38E+02	3.45E-04	4.92E+03	2.51E-01	6.06E-07
Mg 29	1.30E+00	9.42E-02					
Mg 30	3.35E-01	2.40E-01					
Mg 31	2.30E-01	2.55E-02					
Mg 32	9.50E-02	4.89E-02					
Mg 33	9.05E-02	5.67E-02					

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Mg 34	2.00E-02	2.35E-02					
Al 23	4.70E-01	3.37E-02					
Al 25	7.18E+00	7.69E-08					
Al 26	2.27E+13	2.32E-08	4.89E+01	4.73E-10	7.22E+04	5.03E-01	7.18E-13
Al 26*	6.35E+00	3.37E-02					
Al 28	1.34E+02	3.38E-01	3.64E+03	9.29E-05	0.00E+00	3.43E-01	3.42E-07
Al 29	3.94E+02	3.81E-01					
Al 30	3.60E+00	3.76E-01					
Al 31	6.44E-01	1.94E-01					
Al 32	3.17E-02	2.72E-01					
Al 33	1.00E-19	1.14E-01					
Al 34	5.63E-02	8.47E-02					
Al 35	1.00E-19	1.69E-02					
Si 27	4.17E+00	3.37E-02					
Si 31	9.44E+03	2.81E-01	1.75E+04	1.60E-05	2.04E+02	4.33E-04	2.38E-08
Si 32	4.17E+09	3.40E-03	6.90E+01	4.93E-05	5.22E+04	1.94E-06	7.27E-08
Si 33	6.18E+00	1.28E-01					
Si 34	2.77E+00	2.77E-01					
Si 35	7.80E-01	5.06E-02					
Si 36	4.50E-01	8.44E-02					
P 27	3.00E-01	1.69E-02					
P 29	4.14E+00	1.57E-09					
P 30	1.50E+02	1.35E-01	6.84E+03	1.97E-05	0.00E+00	1.83E-01	7.28E-08
P 32	1.23E+06	2.23E-01	2.32E+02	9.59E-04	1.55E+04	3.66E-04	1.41E-06
P 33	2.19E+06	3.98E-01	1.55E+03	2.56E-04	2.32E+03	3.05E-06	3.78E-07
P 34	1.24E+01	4.12E-01					
P 35	4.73E+01	2.63E-01					
P 36	5.60E+00	1.25E-01					
P 37	2.31E+00	2.02E-01					
P 38	6.40E-01	1.18E-01					
S 31	2.57E+00	4.22E-08					
S 35	7.56E+06	6.41E-01	1.46E+03	4.40E-04	2.48E+03	8.99E-07	6.49E-07
S 37	3.03E+02	3.14E-01					
S 38	1.02E+04	2.22E-01					
S 39	1.15E+01	2.53E-01					
S 40	8.80E+00	1.69E-01					
S 41	1.99E+00	8.44E-02					
S 44	1.23E-01	5.06E-02					
Cl 33	2.51E+00	1.69E-02					

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Cl 34	1.53E+00	1.69E-02					
Cl 34*	1.93E+03	2.73E-06					
Cl 36	9.50E+12	1.16E-06	1.64E+02	7.09E-09	2.19E+04	8.25E-05	1.05E-11
Cl 38	2.23E+03	4.58E-01	3.76E+03	1.22E-04	1.18E+02	2.91E-01	4.16E-07
Cl 38*	7.70E-01	3.38E-02					
Cl 39	3.34E+03	4.89E-01	4.10E+03	1.19E-04	1.02E+02	2.70E-01	4.10E-07
Cl 40	8.10E+01	3.37E-01					
Cl 41	3.84E+01	3.71E-01					
Cl 42	6.80E+00	1.86E-01					
Cl 43	3.07E+00	1.44E-01					
Cl 44	5.60E-01	7.52E-02					
Ar 35	1.78E+00	5.05E-02					
Ar 37	3.03E+06	2.66E-01	2.66E+09	1.00E-10	0.00E+00	4.70E-07	7.38E-11
Ar 39	8.49E+09	2.77E-03	3.71E+07	7.45E-11	0.00E+00	3.37E-05	5.49E-11
Ar 41	6.58E+03	7.26E-01	5.20E+03	1.40E-04	0.00E+00	2.41E-01	1.03E-04
Ar 42	1.04E+09	1.35E-02					
Ar 43	3.22E+02	4.35E-01					
Ar 44	7.12E+02	3.40E-01					
Ar 45	2.15E+01	2.36E-01					
Ar 46	8.40E+00	1.35E-01					
K 35	1.90E-01	1.69E-02					
K 38	4.58E+02	1.69E-02	2.06E+03	8.19E-06	0.00E+00	6.07E-01	3.02E-08
K 38*	9.24E-01	3.37E-02					
K 40	4.03E+16	3.26E-10	2.89E+02	1.13E-12	1.24E+04	2.98E-02	1.68E-15
K 42	4.45E+04	2.84E-01	2.38E+03	1.19E-04	1.36E+03	5.40E-02	2.03E-07
K 43	8.03E+04	9.07E-01	3.03E+03	3.00E-04	6.92E+02	1.73E-01	7.19E-07
K 44	1.33E+03	8.12E-01	2.66E+03	3.05E-04	8.29E+01	4.40E-01	1.08E-06
K 45	1.04E+03	6.58E-01	3.33E+03	1.98E-04	5.14E+01	3.58E-01	7.08E-07
K 46	1.05E+02	4.72E-01					
K 47	1.75E+01	4.56E-01					
K 48	6.80E+00	1.69E-01					
K 49	1.26E+00	5.06E-02					
K 50	4.72E-01	6.75E-02					
K 51	3.65E-01	3.37E-02					
K 52	1.05E-01	1.69E-02					
K 53	3.00E-02	3.37E-02					
Ca 35	5.00E-02	1.69E-02					
Ca 39	8.60E-01	3.37E-02					
Ca 41	3.25E+12	1.78E-06	2.67E+03	6.66E-10	1.35E+03	0.00E+00	9.82E-13

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _r (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Ca 45	1.41E+07	1.16E+00	5.44E+02	2.13E-03	6.62E+03	3.19E-06	3.14E-06
Ca 47	3.92E+05	9.64E-01	5.06E+02	1.90E-03	6.55E+03	1.98E-01	3.15E-06
Ca 49	5.23E+02	2.12E-01	1.95E+03	1.08E-04	0.00E+00	6.40E-01	4.00E-07
Ca 50	1.39E+01	1.31E-01					
Ca 51	1.00E+01	8.93E-02					
Ca 52	4.60E+00	1.24E-01					
Ca 53	9.00E-02	5.66E-02					
Ca 54	1.00E-19	1.69E-02					
Sc 41	5.96E-01	1.69E-02					
Sc 42	6.81E-01	3.37E-02					
Sc 42*	6.16E+01	1.69E-02					
Sc 43	1.40E+04	3.54E-02	4.39E+03	8.07E-06	2.59E+02	1.95E-01	2.41E-08
Sc 44	1.41E+04	6.43E-01	2.24E+03	2.88E-04	4.92E+02	3.89E-01	8.67E-07
Sc 44*	2.11E+05	3.38E-02	4.66E+02	7.25E-05	7.59E+03	5.00E-02	1.10E-07
Sc 45*	3.16E-01	5.07E-01					
Sc 46	7.24E+06	6.83E-01	1.17E+02	5.82E-03	2.96E+04	3.69E-01	9.03E-06
Sc 46*	1.87E+01	2.03E-01					
Sc 47	2.89E+05	1.64E+00	1.90E+03	8.63E-04	1.84E+03	1.90E-02	1.33E-06
Sc 48	1.57E+05	6.58E-01	6.11E+02	1.08E-03	4.11E+03	6.22E-01	2.31E-06
Sc 49	3.43E+03	7.52E-01	3.47E+04	2.17E-05	1.02E+02	7.14E-04	3.29E-08
Sc 50	1.03E+02	4.53E-01					
Sc 50*	3.50E-01	2.19E-01					
Sc 51	1.24E+01	3.09E-01					
Sc 52	8.20E+00	5.44E-01					
Sc 53	1.00E-19	1.85E-01					
Sc 54	2.60E-01	5.06E-02					
Ti 43	4.90E-01	1.69E-03					
Ti 44	1.49E+09	2.25E-03	2.01E+01	1.12E-04	1.79E+05	2.05E-02	1.65E-07
Ti 45	1.11E+04	1.52E-01	5.64E+03	2.69E-05	1.93E+02	1.55E-01	8.13E-08
Ti 51	3.46E+02	8.49E-01					
Ti 52	1.02E+02	1.10E+00					
Ti 53	3.27E+01	3.38E-01					
Ti 54	1.50E+00	1.69E-01					
V 44	9.00E-02	1.52E-02					
V 46	4.22E-01	1.69E-02					
V 47	1.96E+03	1.35E-01	6.35E+03	2.13E-05	5.70E+01	1.77E-01	7.37E-08
V 48	1.38E+06	2.87E-01	3.06E+02	9.36E-04	1.02E+04	5.37E-01	1.65E-06
V 49	2.92E+07	7.97E-01	1.04E+04	7.64E-05	3.45E+02	0.00E+00	1.13E-07
V 50	4.70E+24	7.38E-18					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
V 52	2.25E+02	2.01E+00					
V 53	9.60E+01	1.06E+00					
V 54	4.98E+01	6.58E-01					
V 55	6.54E+00	5.57E-01					
V 59	7.50E-02	5.06E-02					
Cr 44	7.66E-02	1.69E-02					
Cr 47	5.08E-01	1.69E-02					
Cr 48	7.76E+04	1.69E-02	3.29E+03	5.14E-06	8.77E+02	7.62E-02	9.85E-09
Cr 49	2.54E+03	8.44E-02	6.02E+03	1.40E-05	6.22E+01	1.86E-01	4.85E-08
Cr 51	2.39E+06	9.28E-01	1.03E+04	9.02E-05	3.34E+02	5.59E-03	1.42E-07
Cr 55	2.10E+02	1.30E+00					
Cr 56	3.56E+02	1.13E+00					
Cr 57	2.11E+01	4.89E-01					
Cr 58	7.00E+00	4.08E-01					
Cr 59	4.60E-01	2.17E-01					
Cr 60	5.60E-01	1.52E-01					
Mn 48	1.50E-01	1.69E-02					
Mn 51	2.77E+03	1.69E-02	5.94E+03	2.84E-06	9.44E+01	1.78E-01	9.49E-09
Mn 52	4.83E+05	2.56E-01	4.78E+02	5.35E-04	5.70E+03	6.36E-01	1.08E-06
Mn 52*	1.27E+03	1.69E-01	2.70E+03	6.25E-05	5.55E+01	4.44E-01	2.25E-07
Mn 53	1.18E+14	2.85E-07	7.21E+03	3.95E-11	5.00E+02	0.00E+00	5.83E-14
Mn 54	2.70E+07	1.02E+00	5.05E+02	2.02E-03	6.70E+03	1.51E-01	3.25E-06
Mn 56	9.28E+03	2.13E+00	2.89E+03	7.37E-04	3.30E+02	3.19E-01	2.29E-06
Mn 57	8.54E+01	1.45E+00					
Mn 58	3.00E+00	8.12E-01					
Mn 58*	3.00E+00	2.53E-01					
Mn 59	4.59E+00	7.90E-01					
Mn 60	5.10E+01	3.07E-01					
Mn 60*	1.77E+00	2.02E-01					
Mn 61	6.70E-01	3.37E-01					
Mn 62	1.78E-01	2.19E-01					
Mn 66	6.44E-02	1.69E-02					
Mn 67	4.50E-02	3.37E-02					
Mn 68	2.80E-02	1.69E-02					
Mn 72	5.84E-03	1.69E-02					
Fe 51	3.10E-01	1.69E-02					
Fe 52	2.98E+04	5.06E-02	1.40E+03	3.61E-05	2.19E+03	1.31E-01	6.49E-08
Fe 52*	4.60E+01	6.06E-20					
Fe 53	5.11E+02	3.37E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Fe 53*	1.50E+02	6.76E-08					
Fe 55	8.62E+07	2.97E-01	2.70E+03	1.10E-04	1.34E+03	0.00E+00	1.63E-07
Fe 59	3.84E+06	1.68E+00	2.80E+02	6.01E-03	1.22E+04	2.21E-01	9.52E-06
Fe 60	4.73E+13	9.56E-07	1.34E+01	7.16E-08	2.70E+05	7.22E-07	1.06E-10
Fe 61	3.59E+02	1.01E+00					
Fe 62	6.80E+01	7.93E-01					
Fe 63	6.10E+00	4.05E-01					
Fe 64	2.00E+00	6.26E-01					
Fe 65	1.30E+00	2.04E-01					
Fe 66	4.40E-01	1.37E-01					
Fe 67	3.94E-01	1.00E-01					
Fe 68	1.87E-01	3.11E-02					
Fe 69	1.09E-01	5.90E-05					
Fe 70	9.40E-02	2.59E-03					
Fe 71	1.48E-01	4.37E-03					
Fe 72	1.02E-01	9.86E-03					
Fe 75	3.31E-02	1.69E-02					
Co 54	1.93E-01	2.97E-14					
Co 54*	8.88E+01	1.86E-14					
Co 55	6.31E+04	8.38E-06	1.15E+03	7.29E-09	2.09E+03	3.62E-01	1.61E-11
Co 56	6.80E+06	2.17E-01	8.67E+01	2.50E-03	3.96E+04	6.77E-01	3.95E-06
Co 57	2.35E+07	4.46E-01	3.95E+02	1.13E-03	9.07E+03	2.08E-02	1.68E-06
Co 58	6.13E+06	1.20E+00	3.16E+02	3.78E-03	1.09E+04	1.76E-01	5.95E-06
Co 58*	3.29E+04	2.54E-01	3.83E+04	6.62E-06	9.40E+01	3.24E-07	9.76E-09
Co 60	1.66E+08	2.34E-01	1.64E+01	1.43E-02	2.19E+05	4.66E-01	2.13E-05
Co 60*	6.28E+02	9.85E-01	8.12E+05	1.21E-06	2.12E+00	8.03E-04	3.19E-09
Co 61	5.94E+03	2.23E+00	2.44E+04	9.14E-05	1.06E+02	1.46E-02	1.92E-07
Co 62	9.00E+01	1.20E+00					
Co 62*	8.35E+02	2.53E-01	2.41E+03	1.05E-04	3.52E+01	5.07E-01	3.82E-07
Co 63	2.69E+01	1.15E+00					
Co 64	3.00E-01	1.06E+00					
Co 65	1.20E+00	4.56E-01					
Co 66	1.94E-01	3.23E-01					
Co 67	4.25E-01	2.52E-01					
Co 68	7.78E-02	1.32E-01					
Co 69	2.27E-01	1.18E-01					
Co 70	5.58E-02	5.38E-02					
Co 71	9.70E-02	2.23E-02					
Co 72	9.00E-02	2.48E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Co 73	3.07E-02	1.94E-02					
Co 74	2.30E-02	8.76E-03					
Co 75	1.88E-02	5.56E-03					
Ni 55	1.89E-01	1.90E-17					
Ni 56	5.27E+05	7.22E-10	7.31E+02	9.87E-13	4.03E+03	3.11E-01	1.85E-15
Ni 57	1.28E+05	1.69E-02	1.23E+03	1.37E-05	1.89E+03	3.59E-01	3.09E-08
Ni 59	2.37E+12	1.11E-05	3.93E+03	2.82E-09	9.18E+02	0.00E+00	4.16E-12
Ni 63	3.16E+09	2.44E-02	1.57E+03	1.56E-05	2.30E+03	0.00E+00	2.30E-08
Ni 65	9.06E+03	1.16E+00	6.94E+03	1.68E-04	2.22E+02	1.03E-01	4.60E-07
Ni 66	1.97E+05	1.17E+00	4.33E+02	2.70E-03	8.33E+03	2.28E-06	3.98E-06
Ni 67	2.10E+01	7.08E-01					
Ni 68	2.90E+01	5.37E-01					
Ni 69	1.15E+01	2.87E-01					
Ni 70	6.00E+00	2.05E-01					
Ni 71	2.56E+00	1.24E-01					
Ni 72	1.57E+00	7.55E-02					
Ni 73	8.40E-01	5.29E-02					
Ni 74	6.80E-01	8.70E-03					
Ni 75	6.00E-01	4.88E-03					
Cu 59	8.15E+01	1.69E-02					
Cu 60	1.46E+03	1.69E-02	1.66E+03	1.02E-05	5.77E+01	7.33E-01	3.69E-08
Cu 61	1.23E+04	4.55E-01	5.88E+03	7.75E-05	1.87E+02	1.48E-01	2.33E-07
Cu 62	5.84E+02	1.23E+00	6.95E+03	1.77E-04	0.00E+00	1.80E-01	6.53E-07
Cu 64	4.57E+04	1.98E+00	9.64E+03	2.05E-04	2.77E+02	3.37E-02	4.20E-07
Cu 66	3.07E+02	2.50E+00	7.57E+04	3.30E-05	0.00E+00	1.65E-02	1.22E-07
Cu 67	2.23E+05	1.97E+00	2.80E+03	7.05E-04	1.23E+03	2.00E-02	1.11E-06
Cu 67*	1.00E-08	1.55E-11					
Cu 68	3.11E+01	1.13E+00					
Cu 68*	2.25E+02	8.44E-02					
Cu 69	1.71E+02	7.93E-01					
Cu 70	4.50E+00	3.22E-01					
Cu 70*	4.70E+01	2.04E-01					
Cu 71	1.94E+01	4.10E-01					
Cu 72	6.60E+00	2.27E-01					
Cu 73	4.20E+00	1.20E-01					
Cu 74	1.59E+00	1.44E-01					
Cu 75	1.22E+00	3.83E-02					
Cu 76	2.60E-01	1.69E-02					
Cu 77	4.69E-01	3.37E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Zn 62	3.33E+04	5.06E-02	1.58E+03	3.21E-05	2.06E+03	7.66E-02	5.41E-08
Zn 63	2.29E+03	2.70E-01	5.55E+03	4.86E-05	8.14E+01	1.97E-01	1.66E-07
Zn 65	2.11E+07	1.28E+00	1.74E+02	7.33E-03	2.04E+04	1.07E-01	1.11E-05
Zn 69	3.38E+03	1.81E+00	9.13E+04	1.98E-05	3.92E+01	7.99E-05	2.94E-08
Zn 69*	4.95E+04	3.55E-01	3.51E+03	1.01E-04	8.14E+02	7.36E-02	1.95E-07
Zn 71	1.47E+02	7.14E-01					
Zn 71*	1.42E+04	2.19E-01	3.03E+03	7.23E-05	3.89E+02	2.78E-01	2.14E-07
Zn 72	1.67E+05	5.31E-01	7.11E+02	7.47E-04	5.00E+03	2.55E-02	1.13E-06
Zn 73	2.35E+01	3.23E-01					
Zn 73*	5.80E+00	3.37E-02					
Zn 74	9.56E+01	4.49E-01					
Zn 75	1.02E+01	1.05E-01					
Zn 76	5.70E+00	7.06E-02					
Zn 77	2.08E+00	8.08E-02					
Zn 77*	1.05E+00	1.69E-02					
Zn 78	1.47E+00	6.75E-02					
Zn 79	9.95E-01	1.69E-02					
Zn 81	2.90E-01	1.69E-02					
Zn 82	2.75E-01	1.69E-02					
Zn 84	1.55E-01	1.69E-02					
Zn 85	1.94E-02	1.69E-02					
Ga 64	1.58E+02	5.06E-02					
Ga 65	9.12E+02	8.44E-02	5.71E+03	1.48E-05	2.82E+01	2.09E-01	5.30E-08
Ga 66	3.42E+04	6.92E-01	1.11E+03	6.21E-04	1.86E+03	4.77E-01	1.50E-06
Ga 67	2.82E+05	1.52E+00	5.67E+03	2.68E-04	5.59E+02	2.66E-02	4.67E-07
Ga 68	4.06E+03	2.73E+00	5.98E+03	4.55E-04	1.14E+02	1.69E-01	1.49E-06
Ga 70	1.27E+03	1.29E+00	1.14E+05	1.13E-05	2.68E+01	1.71E-03	2.06E-08
Ga 72	5.08E+04	1.25E+00	1.08E+03	1.16E-03	1.86E+03	5.14E-01	2.85E-06
Ga 72*	3.70E-02	6.75E-02					
Ga 73	1.75E+04	1.37E+00	6.68E+03	2.05E-04	3.81E+02	5.48E-02	4.35E-07
Ga 74	4.87E+02	8.20E-01					
Ga 74*	9.50E+00	3.87E-01					
Ga 75	1.26E+02	5.60E-01					
Ga 76	3.26E+01	2.22E-01					
Ga 77	1.32E+01	2.83E-01					
Ga 78	5.09E+00	1.01E-01					
Ga 79	2.85E+00	8.41E-02					
Ga 80	1.70E+00	5.19E-02					
Ga 81	1.22E+00	5.69E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Ga 82	5.99E-01	1.16E-02					
Ga 83	3.08E-01	2.66E-02					
Ga 84	8.50E-02	1.12E-02					
Ga 85	2.04E-01	1.05E-02					
Ga 87	6.85E-02	1.69E-02					
Ge 65	3.09E+01	1.69E-02					
Ge 66	8.14E+03	6.75E-02	5.43E+03	1.24E-05	3.17E+02	1.20E-01	3.27E-08
Ge 67	1.12E+03	3.38E-02	4.59E+03	7.36E-06	5.33E+01	2.54E-01	2.60E-08
Ge 68	2.34E+07	6.83E-01	6.95E+01	9.82E-03	5.18E+04	2.73E-07	1.45E-05
Ge 69	1.41E+05	1.45E+00	2.78E+03	5.22E-04	8.40E+02	1.58E-01	1.18E-06
Ge 71	9.88E+05	2.92E+00	2.94E+04	9.93E-05	1.22E+02	2.76E-07	1.46E-07
Ge 71*	2.04E-02	7.59E-01					
Ge 73*	4.99E-01	3.58E+00					
Ge 75	4.97E+03	1.34E+00	4.21E+04	3.18E-05	6.77E+01	6.22E-03	6.16E-08
Ge 75*	4.77E+01	3.65E-01					
Ge 77	4.07E+04	1.83E-01	2.22E+03	8.23E-05	1.05E+03	1.97E-01	1.85E-07
Ge 77*	5.29E+01	4.69E-01					
Ge 78	5.28E+03	2.20E-01	8.38E+03	2.62E-05	2.87E+02	4.96E-02	5.79E-08
Ge 79	1.90E+01	1.66E-01					
Ge 79*	3.90E+01	3.81E-02					
Ge 80	2.95E+01	1.76E-01					
Ge 81	8.00E+00	6.30E-02					
Ge 81*	7.50E+00	4.02E-02					
Ge 82	4.55E+00	1.06E-01					
Ge 83	1.85E+00	2.30E-02					
Ge 84	9.54E-01	2.78E-02					
Ge 85	5.40E-01	5.17E-03					
Ge 86	6.45E-01	1.16E-02					
Ge 87	3.52E-01	1.93E-03					
Ge 90	4.30E-02	1.69E-02					
Ge 92	1.74E-02	1.69E-02					
As 66	9.58E-02	1.69E-02					
As 69	9.14E+02	5.06E-02	6.32E+03	8.01E-06	4.88E+01	1.81E-01	2.80E-08
As 70	3.16E+03	1.52E-01	1.57E+03	9.70E-05	1.27E+02	7.55E-01	3.46E-07
As 71	2.35E+05	8.77E-01	2.30E+03	3.81E-04	1.27E+03	1.01E-01	7.20E-07
As 72	9.36E+04	2.38E+00	7.20E+02	3.31E-03	4.07E+03	3.25E-01	6.24E-06
As 73	6.94E+06	3.87E+00	1.04E+03	3.71E-03	3.46E+03	7.03E-04	5.48E-06
As 74	1.54E+06	1.96E+00	4.32E+02	4.54E-03	7.96E+03	1.35E-01	7.17E-06
As 75*	1.68E-02	3.21E-01					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
As 76	9.48E+04	1.25E+00	9.09E+02	1.37E-03	3.74E+03	7.88E-02	2.20E-06
As 77	1.40E+05	1.77E+00	3.40E+03	5.20E-04	1.05E+03	1.59E-03	7.72E-07
As 78	5.44E+03	9.79E-01	3.83E+03	2.56E-04	2.67E+02	2.34E-01	7.82E-07
As 79	5.41E+02	8.10E-01					
As 80	1.52E+01	3.28E-01					
As 81	3.33E+01	4.74E-01					
As 82	1.91E+01	1.57E-01					
As 82*	1.36E+01	9.78E-08					
As 83	1.34E+01	7.66E-02					
As 84	5.50E+00	7.61E-02					
As 85	2.02E+00	7.31E-03					
As 86	9.45E-01	9.46E-03					
As 87	6.10E-01	1.81E-02					
As 88	4.28E-01	5.23E-04					
As 89	2.10E-01	2.96E-02					
As 90	2.00E-02	4.87E-03					
As 91	5.76E-02	9.73E-03					
As 92	3.07E-02	5.89E-03					
Se 71	2.84E+02	4.75E-07					
Se 72	7.26E+05	4.89E-01					
Se 73	2.57E+04	5.38E-01	3.57E+03	1.51E-04	4.59E+02	1.91E-01	4.04E-07
Se 73*	2.39E+03	4.39E-01	2.11E+04	2.08E-05	4.63E+01	4.33E-02	6.43E-08
Se 75	1.03E+07	2.28E+00	4.15E+02	5.48E-03	8.47E+03	6.85E-02	8.35E-06
Se 77*	1.75E+01	6.08E-01	8.38E+04	7.25E-06	0.00E+00	1.49E-02	2.67E-08
Se 79	1.04E+12	4.90E-05	3.66E+02	1.34E-07	9.84E+03	1.12E-06	1.97E-10
Se 79*	2.35E+02	1.12E+00					
Se 81	1.11E+03	8.80E-01	1.29E+05	6.79E-06	2.22E+01	1.94E-03	1.30E-08
Se 81*	3.44E+03	1.49E-01	4.22E+04	3.54E-06	7.88E+01	2.29E-03	5.83E-09
Se 82	4.40E+27	3.14E-21					
Se 83	1.34E+03	5.68E-02	2.69E+03	2.11E-05	4.70E+01	4.48E-01	7.61E-08
Se 83*	7.01E+01	1.04E-01					
Se 84	1.86E+02	1.48E-01					
Se 85	3.17E+01	2.29E-02					
Se 86	1.53E+01	2.60E-02					
Se 87	5.50E+00	4.96E-02					
Se 88	1.53E+00	3.99E-02					
Se 89	4.10E-01	8.29E-03					
Se 90	7.22E-01	3.13E-02					
Se 91	2.70E-01	3.39E-03					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Se 92	1.37E-01	9.00E-04					
Br 74	1.52E+03	6.75E-02	1.37E+03	4.92E-05	8.62E+01	8.81E-01	1.78E-07
Br 74*	2.76E+03	5.06E-02	1.51E+03	3.35E-05	1.64E+02	7.70E-01	1.18E-07
Br 75	5.82E+03	5.40E-01	4.78E+03	1.13E-04	1.31E+02	2.16E-01	3.73E-07
Br 76	5.83E+04	1.26E+00	1.35E+03	9.37E-04	1.24E+03	4.96E-01	2.49E-06
Br 76*	1.31E+00	5.90E-01					
Br 77	2.05E+05	2.61E+00	9.64E+03	2.71E-04	2.13E+02	5.59E-02	6.59E-07
Br 77*	2.57E+02	2.87E-01					
Br 78	3.88E+02	2.03E+00					
Br 79*	4.86E+00	6.29E-01					
Br 80	1.06E+03	1.59E+00	5.20E+04	3.06E-05	2.82E+01	1.42E-02	8.53E-08
Br 80*	1.59E+04	6.64E-01	1.05E+04	6.35E-05	3.41E+02	1.15E-03	9.49E-08
Br 82	1.27E+05	8.50E-01	1.38E+03	6.16E-04	1.22E+03	4.81E-01	1.63E-06
Br 82*	3.68E+02	7.14E-01					
Br 83	8.64E+03	9.37E-01	3.99E+04	2.35E-05	8.62E+01	1.41E-03	3.70E-08
Br 84	1.91E+03	3.17E-01	3.27E+03	9.67E-05	9.66E+01	3.48E-01	3.38E-07
Br 84*	3.60E+02	5.06E-02					
Br 85	1.74E+02	2.09E-01					
Br 86	5.51E+01	1.27E-01					
Br 87	5.57E+01	1.68E-01					
Br 88	1.64E+01	9.08E-02					
Br 89	4.40E+00	4.16E-02					
Br 90	1.91E+00	4.86E-02					
Br 91	5.41E-01	3.64E-02					
Br 92	3.43E-01	8.70E-04					
Br 94	7.00E-02	1.69E-02					
Kr 74	6.90E+02	1.69E-02	6.04E+03	2.79E-06	0.00E+00	2.07E-01	2.06E-06
Kr 76	5.33E+04	1.01E-01	1.66E+04	6.08E-06	0.00E+00	7.51E-02	4.49E-06
Kr 77	4.46E+03	7.76E-01	6.95E+03	1.12E-04	0.00E+00	1.80E-01	8.23E-05
Kr 79	1.26E+05	2.21E+00	2.79E+04	7.93E-05	0.00E+00	4.48E-02	5.85E-05
Kr 79*	5.00E+01	6.42E-01					
Kr 81	6.72E+12	1.67E-05	1.27E+06	1.32E-11	0.00E+00	9.88E-04	9.73E-12
Kr 81*	1.30E+01	5.99E-01	5.50E+04	1.09E-05	0.00E+00	2.27E-02	8.03E-06
Kr 83*	6.59E+03	1.38E+00	2.25E+08	6.14E-09	0.00E+00	5.55E-06	4.53E-09
Kr 85	3.40E+08	3.30E-02	2.84E+06	1.16E-08	0.00E+00	4.40E-04	8.58E-09
Kr 85*	1.61E+04	4.28E-01	4.52E+04	9.48E-06	0.00E+00	2.77E-02	6.99E-06
Kr 87	4.58E+03	3.38E-01	8.20E+03	4.13E-05	0.00E+00	1.52E-01	3.04E-05
Kr 88	1.02E+04	2.26E-01	3.31E+03	6.81E-05	0.00E+00	3.77E-01	5.02E-05
Kr 89	1.89E+02	9.88E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF ₁ (rem/Ci)	DCF ₅ (rem·m ³ /(Ci·s))	MEOI dose (rem)
Kr 90	3.23E+01	6.05E-02					
Kr 91	8.57E+00	4.63E-02					
Kr 92	1.84E+00	1.77E-02					
Kr 93	1.29E+00	1.16E-02					
Kr 94	2.10E-01	3.88E-02					
Kr 96	8.00E-02	1.69E-02					
Rb 74	6.49E-02	1.69E-02					
Rb 77	2.25E+02	1.69E-02					
Rb 78	1.06E+03	5.06E-03					
Rb 78*	3.44E+02	5.06E-02					
Rb 79	1.37E+03	2.19E-01	4.85E+03	4.53E-05	4.92E+01	2.41E-01	1.60E-07
Rb 80	3.40E+01	1.27E+00	5.57E+03	2.27E-04	0.00E+00	2.25E-01	8.38E-07
Rb 81	1.65E+04	1.98E+00	8.09E+03	2.45E-04	1.30E+02	1.10E-01	7.46E-07
Rb 81*	1.83E+03	3.71E-01	1.63E+05	2.28E-06	2.01E+01	6.96E-04	3.81E-09
Rb 82	7.64E+01	2.26E+00	6.37E+03	3.55E-04	0.00E+00	1.96E-01	1.31E-06
Rb 82*	2.33E+04	9.79E-01	1.99E+03	4.93E-04	2.90E+02	5.29E-01	1.64E-06
Rb 83	7.45E+06	3.58E+00	6.96E+02	5.14E-03	4.92E+03	8.84E-02	8.15E-06
Rb 83*	7.20E-08	9.96E-06					
Rb 84	2.84E+06	1.76E+00	5.15E+02	3.42E-03	6.51E+03	1.65E-01	5.56E-06
Rb 84*	1.23E+03	5.10E-01					
Rb 86	1.61E+06	1.18E+00	5.40E+02	2.19E-03	6.62E+03	1.78E-02	3.27E-06
Rb 86*	6.10E+01	2.03E-01					
Rb 87	1.51E+18	2.51E-11	1.11E+03	2.25E-14	3.23E+03	6.73E-06	3.32E-17
Rb 88	1.07E+03	5.29E-01	8.15E+03	6.49E-05	8.36E+01	1.24E-01	2.12E-07
Rb 89	9.09E+02	4.36E-01	3.07E+03	1.42E-04	4.29E+01	3.92E-01	5.12E-07
Rb 90	1.58E+02	1.22E-01					
Rb 90*	2.58E+02	4.10E-02					
Rb 91	5.84E+01	1.64E-01					
Rb 92	4.49E+00	1.02E-01					
Rb 93	5.84E+00	4.55E-02					
Rb 94	2.70E+00	5.52E-02					
Rb 95	3.78E-01	1.75E-02					
Rb 96	5.46E-02	3.31E-02					
Rb 98	1.14E-01	1.69E-02					
Rb100	5.10E-02	1.69E-02					
Sr 79	1.35E+02	1.69E-02					
Sr 80	6.38E+03	8.44E-02	7.16E+03	1.18E-05	5.03E+02	2.42E-05	1.74E-08
Sr 81	1.34E+03	2.36E-01	4.52E+03	5.22E-05	8.44E+01	2.47E-01	1.80E-07
Sr 82	2.21E+06	1.01E+00	2.69E+02	3.76E-03	1.34E+04	2.38E-05	5.55E-06

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Sr 83	1.17E+05	1.72E+00	3.12E+03	5.52E-04	7.44E+02	1.43E-01	1.25E-06
Sr 83*	4.95E+00	3.54E-01					
Sr 85	5.60E+06	3.46E+00	1.66E+03	2.09E-03	1.92E+03	8.95E-02	3.63E-06
Sr 85*	4.06E+03	1.05E+00	2.99E+04	3.50E-05	8.33E+00	3.89E-02	1.24E-07
Sr 87*	1.01E+04	6.60E-01	1.76E+04	3.76E-05	4.29E+01	5.62E-02	1.21E-07
Sr 89	4.37E+06	1.16E+00	5.53E+02	2.10E-03	6.51E+03	2.86E-04	3.10E-06
Sr 90	9.09E+08	1.85E-02	1.50E+01	1.23E-03	2.39E+05	2.79E-05	1.82E-06
Sr 91	3.47E+04	4.51E-01	2.77E+03	1.63E-04	9.32E+02	1.28E-01	3.42E-07
Sr 92	9.58E+03	3.05E-01	2.66E+03	1.15E-04	6.29E+02	2.51E-01	3.05E-07
Sr 93	4.45E+02	1.01E-01					
Sr 94	7.53E+01	1.02E-01					
Sr 95	2.39E+01	8.79E-02					
Sr 96	1.07E+00	6.24E-02					
Sr 97	4.29E-01	1.92E-02					
Sr 98	6.53E-01	4.83E-02					
Sr 99	2.69E-01	9.45E-04					
Sr100	2.02E-01	3.28E-02					
Y 80	3.38E+01	1.69E-02					
Y 81	7.24E+01	1.69E-02					
Y 82	9.50E+00	1.69E-02					
Y 83	4.25E+02	3.37E-02					
Y 83*	1.71E+02	1.69E-02					
Y 84	4.60E+00	2.19E-01					
Y 84*	2.40E+03	1.35E-01					
Y 85	9.65E+03	7.25E-01					
Y 85*	1.75E+04	4.22E-01					
Y 86	5.31E+04	2.55E+00	9.93E+02	2.57E-03	1.72E+03	6.62E-01	6.77E-06
Y 86*	2.88E+03	1.01E-01	1.69E+04	5.97E-06	9.95E+01	3.92E-02	1.58E-08
Y 87	2.89E+05	2.99E+00	1.82E+03	1.64E-03	1.75E+03	7.96E-02	2.85E-06
Y 87*	4.64E+04	1.05E+00					
Y 88	9.21E+06	4.04E+00	1.22E+02	3.32E-02	2.81E+04	5.07E-01	5.25E-05
Y 88*	1.00E-08	1.35E-01					
Y 89*	1.61E+01	3.62E+00					
Y 90	2.30E+05	7.11E-01	4.27E+02	1.67E-03	8.44E+03	7.03E-04	2.46E-06
Y 90*	1.15E+04	1.18E-01	4.55E+03	2.59E-05	4.70E+02	1.11E-01	6.15E-08
Y 91	5.06E+06	1.06E+00	7.38E+01	1.43E-02	4.88E+04	9.62E-04	2.11E-05
Y 91*	2.98E+03	5.82E-01	1.17E+04	4.98E-05	3.63E+01	9.44E-02	1.71E-07
Y 92	1.27E+04	6.77E-01	3.92E+03	1.73E-04	7.81E+02	4.81E-02	3.12E-07
Y 93	3.66E+04	5.73E-01	1.63E+03	3.51E-04	2.15E+03	1.78E-02	5.36E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
Identification No.: CN-LANSCE-LFO-07-002
Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF ₁ (rem/Ci)	DCF ₅ (rem·m ³ /(Ci·s))	MEOI dose (rem)
Y 93*	8.20E-01	1.53E-01					
Y 94	1.12E+03	2.87E-01	5.38E+03	5.34E-05	6.99E+01	2.08E-01	1.85E-07
Y 95	6.18E+02	2.40E-01	6.57E+03	3.65E-05	3.77E+01	1.77E-01	1.29E-07
Y 96	5.34E+00	6.24E-02					
Y 96*	9.60E+00	5.06E-02					
Y 96#	1.00E-01	8.58E-08					
Y 97	3.75E+00	5.02E-02					
Y 97*	1.23E+00	7.04E-02					
Y 98	5.48E-01	8.19E-02					
Y 99	1.47E+00	1.81E-02					
Y 100	7.35E-01	3.25E-02					
Y 100*	9.40E-01	1.69E-02					
Y 105	4.57E-02	1.69E-02					
Y 107	2.94E-02	1.69E-02					
Zr 83	4.40E+01	1.69E-02					
Zr 85	4.72E+02	1.86E-01					
Zr 85*	1.09E+01	5.06E-02					
Zr 86	5.94E+04	7.59E-01	1.66E+03	4.56E-04	2.03E+03	4.74E-02	7.36E-07
Zr 87	6.24E+03	1.06E+00					
Zr 87*	1.40E+01	5.06E-02					
Zr 88	7.21E+06	2.55E+00	3.25E+02	7.83E-03	1.09E+04	6.96E-02	1.19E-05
Zr 89	2.82E+05	2.72E+00	1.26E+03	2.15E-03	2.24E+03	2.10E-01	4.19E-06
Zr 89*	2.51E+02	7.42E-01					
Zr 90*	8.09E-01	1.07E+00					
Zr 93	4.83E+13	8.49E-07	4.33E+01	1.96E-08	8.33E+04	0.00E+00	2.89E-11
Zr 95	5.53E+06	5.58E-01	2.22E+02	2.52E-03	1.59E+04	1.33E-01	3.85E-06
Zr 97	6.08E+04	2.39E-01	8.97E+02	2.66E-04	3.92E+03	3.34E-02	4.07E-07
Zr 98	3.07E+01	1.83E-01					
Zr 99	2.10E+00	8.55E-02					
Zr100	7.10E+00	8.29E-02					
Zr101	2.30E+00	1.69E-02					
Zr102	2.90E+00	5.06E-02					
Zr103	1.30E+00	3.37E-02					
Zr104	1.20E+00	2.79E-03					
Zr105	6.00E-01	1.41E-02					
Zr106	3.22E-01	5.97E-03					
Zr107	1.77E-01	1.09E-02					
Nb 87	1.56E+02	1.69E-02					
Nb 88*	4.68E+02	5.06E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _T (rem/Ci)	DCF _S (rem·m ³ / (Ci·s))	MEOI dose (rem)
Nb 89	7.32E+03	1.86E-01	3.12E+03	5.95E-05	4.11E+02	2.58E-01	1.73E-07
Nb 89*	3.96E+03	1.52E-01	3.09E+03	4.91E-05	1.79E+02	3.43E-01	1.65E-07
Nb 90	5.26E+04	8.44E-01	7.82E+02	1.08E-03	2.29E+03	8.03E-01	2.79E-06
Nb 90*	1.88E+01	3.72E-01					
Nb 91	2.15E+10	3.14E-03					
Nb 91*	5.36E+06	9.42E-01					
Nb 92	1.10E+15	9.05E-09					
Nb 92*	8.77E+05	1.11E+00					
Nb 93*	5.09E+08	2.81E-02	1.23E+02	2.28E-04	2.92E+04	1.64E-05	3.36E-07
Nb 94	6.41E+11	4.58E-05	8.68E+00	5.28E-06	4.14E+05	2.85E-01	7.81E-09
Nb 94*	3.76E+02	6.43E-01					
Nb 95	3.02E+06	1.60E+00	5.80E+02	2.76E-03	5.81E+03	1.38E-01	4.46E-06
Nb 95*	3.12E+05	3.78E-01	1.46E+03	2.59E-04	2.44E+03	1.08E-02	3.89E-07
Nb 96	8.41E+04	7.77E-01	1.01E+03	7.72E-04	2.29E+03	4.48E-01	1.76E-06
Nb 97	4.33E+03	5.26E-01	8.54E+03	6.16E-05	8.29E+01	1.18E-01	2.00E-07
Nb 97*	6.00E+01	2.43E-01	9.52E+03	2.56E-05	0.00E+00	1.31E-01	9.43E-08
Nb 98	2.86E+00	2.84E-01					
Nb 98*	3.08E+03	2.36E-01	2.55E+03	9.26E-05	1.22E+02	4.48E-01	3.24E-07
Nb 99	1.50E+01	1.90E-01					
Nb 99*	1.56E+02	4.76E-02					
Nb100	1.50E+00	1.50E-01					
Nb100*	2.98E+00	1.69E-02					
Nb101	7.10E+00	1.18E-01					
Nb102	1.30E+00	6.75E-02					
Nb102*	4.30E+00	1.69E-02					
Nb103	1.50E+00	5.06E-02					
Nb104	4.80E+00	1.97E-02					
Nb105	2.95E+00	4.79E-02					
Nb106	9.20E-01	6.10E-03					
Nb107	3.00E-01	1.07E-02					
Nb115	1.55E-02	1.69E-02					
Mo 87	1.46E+01	1.69E-02					
Mo 90	2.04E+04	8.44E-02	2.18E+03	3.88E-05	1.24E+03	1.45E-01	7.89E-08
Mo 91	9.29E+02	4.56E-01					
Mo 91*	6.52E+01	1.01E-01					
Mo 93	1.10E+11	3.81E-04	1.27E+02	3.01E-06	2.84E+04	9.32E-05	4.43E-09
Mo 93*	2.50E+04	8.34E-05	2.27E+03	3.68E-08	3.85E+02	4.18E-01	1.16E-10
Mo 99	2.37E+05	6.43E-01	8.92E+02	7.21E-04	3.96E+03	2.69E-02	1.09E-06
Mo101	8.77E+02	2.19E-01	4.68E+03	4.69E-05	3.65E+01	2.54E-01	1.68E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Mo102	6.78E+02	2.19E-01					
Mo103	6.75E+01	2.53E-01					
Mo104	6.00E+01	7.11E-02					
Mo105	3.56E+01	8.11E-02					
Mo106	8.73E+00	4.02E-02					
Mo107	3.50E+00	2.69E-02					
Mo108	1.09E+00	1.69E-02					
Mo110	3.00E-01	1.69E-02					
Mo112	5.81E-01	1.52E-05					
Mo113	1.21E-01	2.18E-04					
Mo114	1.03E-01	9.60E-03					
Mo115	4.92E-02	7.03E-03					
Tc 92	2.64E+02	3.37E-02					
Tc 93	9.90E+03	2.40E-01	4.30E+03	5.58E-05	5.03E+01	2.73E-01	1.98E-07
Tc 93*	2.61E+03	1.35E-01	8.55E+03	1.58E-05	2.38E+01	1.38E-01	5.63E-08
Tc 94	1.76E+04	2.87E-01	2.26E+03	1.27E-04	2.10E+02	4.81E-01	4.32E-07
Tc 94*	3.12E+03	3.88E-01	3.33E+03	1.16E-04	1.01E+02	3.40E-01	4.05E-07
Tc 95	7.20E+04	8.76E-01	5.46E+03	1.60E-04	2.50E+02	1.42E-01	4.57E-07
Tc 95*	5.27E+06	3.87E-01	8.52E+02	4.54E-04	3.89E+03	1.20E-01	7.51E-07
Tc 96	3.70E+05	8.81E-01	9.80E+02	8.99E-04	2.38E+03	4.51E-01	2.03E-06
Tc 96*	3.09E+03	6.92E-01	7.66E+04	9.04E-06	2.32E+01	8.29E-03	2.35E-08
Tc 97	8.20E+13	8.14E-07	3.63E+03	2.24E-10	9.92E+02	1.23E-04	3.31E-13
Tc 97*	7.82E+06	3.48E-01	7.37E+02	4.72E-04	4.88E+03	1.72E-04	6.97E-07
Tc 98	1.33E+14	1.87E-07	1.53E+02	1.22E-09	2.29E+04	2.54E-01	1.89E-12
Tc 99	6.66E+12	6.69E-06	4.33E+02	1.55E-08	8.33E+03	5.99E-06	2.28E-11
Tc 99*	2.16E+04	9.40E-01	4.03E+04	2.33E-05	2.67E+01	2.18E-02	7.07E-08
Tc100	1.58E+01	4.97E-01					
Tc101	8.53E+02	7.76E-01	1.93E+04	4.01E-05	1.46E+01	5.96E-02	1.41E-07
Tc102	5.28E+00	4.06E-01					
Tc102*	2.61E+02	3.37E-02					
Tc103	5.42E+01	3.54E-01					
Tc104	1.10E+03	2.23E-01	3.15E+03	7.07E-05	6.51E+01	3.74E-01	2.52E-07
Tc105	4.56E+02	1.65E-01					
Tc106	3.56E+01	7.39E-02					
Tc107	2.12E+01	4.38E-02					
Tc108	5.17E+00	1.69E-02					
Tc109	8.60E-01	1.69E-02					
Tc110	9.20E-01	3.37E-02					
Tc111	2.90E-01	4.71E-08					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Tc112	2.90E-01	2.24E-05					
Tc113	1.70E-01	6.36E-04					
Tc114	1.50E-01	9.61E-03					
Tc115	7.07E-02	6.60E-03					
Ru 94	3.11E+03	1.86E-01	9.34E+03	1.99E-05	1.15E+02	9.40E-02	6.02E-08
Ru 95	5.90E+03	3.54E-01					
Ru 97	2.51E+05	1.22E+00	6.35E+03	1.92E-04	4.51E+02	4.03E-02	3.70E-07
Ru103	3.39E+06	7.26E-01	3.92E+02	1.85E-03	8.95E+03	8.33E-02	2.84E-06
Ru103*	1.69E-03	8.44E-02					
Ru105	1.60E+04	3.35E-01	4.18E+03	8.00E-05	4.55E+02	1.41E-01	2.01E-07
Ru106	3.23E+07	1.82E-01	7.55E+00	2.41E-02	4.77E+05	0.00E+00	3.55E-05
Ru107	2.25E+02	6.07E-02					
Ru108	2.73E+02	1.18E-01					
Ru109	3.45E+01	3.37E-02					
Ru109*	1.30E+01	3.79E-10					
Ru110	1.16E+01	6.75E-02					
Ru111	2.12E+00	1.69E-02					
Ru112	1.75E+00	1.69E-02					
Ru113	8.00E-01	1.42E-03					
Ru114	5.30E-01	1.02E-02					
Ru115	7.40E-01	2.21E-02					
Rh 96	5.94E+02	3.71E-02					
Rh 96*	9.06E+01	3.37E-02					
Rh 97	1.87E+03	9.01E-02					
Rh 97*	2.66E+03	1.18E-01					
Rh 98	5.22E+02	3.04E-01					
Rh 98*	2.10E+02	2.19E-01					
Rh 99	1.39E+06	4.05E-01	1.06E+03	3.82E-04	3.09E+03	1.05E-01	6.39E-07
Rh 99*	1.69E+04	5.23E-01	8.30E+03	6.30E-05	8.33E+01	1.22E-01	2.06E-07
Rh100	7.49E+04	1.69E+00	1.25E+03	1.36E-03	1.39E+03	5.22E-01	3.57E-06
Rh100*	2.76E+02	5.57E-01					
Rh101	1.04E+08	2.89E-01	9.07E+01	3.19E-03	3.96E+04	4.48E-02	4.73E-06
Rh101*	3.75E+05	7.77E-01	4.01E+03	1.94E-04	7.47E+02	5.22E-02	3.58E-07
Rh102	9.15E+07	3.44E-01	2.98E+01	1.15E-02	1.20E+05	3.85E-01	1.73E-05
Rh102*	1.79E+07	1.95E-03	7.51E+01	2.60E-05	4.77E+04	8.55E-02	3.87E-08
Rh103*	3.37E+03	2.38E+00	7.52E+05	3.16E-06	4.70E+00	3.26E-05	4.80E-09
Rh104	4.23E+01	7.92E-01					
Rh104*	2.60E+02	2.57E-01					
Rh105	1.27E+05	9.07E-01	3.62E+03	2.50E-04	9.55E+02	1.38E-02	3.91E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target
 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Rh105*	4.50E+01	1.96E-01					
Rh106	2.98E+01	4.53E-01	3.25E+04	1.39E-05	0.00E+00	3.85E-02	5.14E-08
Rh106*	7.80E+03	1.19E-01	2.10E+03	5.64E-05	1.79E+02	5.33E-01	1.95E-07
Rh107	1.30E+03	3.14E-01	1.99E+04	1.58E-05	2.13E+01	5.55E-02	5.41E-08
Rh108	1.68E+01	3.21E-01					
Rh108*	3.60E+02	1.02E-06					
Rh109	8.00E+01	1.35E-01					
Rh109*	5.00E+01	1.69E-02					
Rh110	3.16E+00	6.75E-02					
Rh110*	2.85E+01	1.18E-01					
Rh111	1.10E+01	1.69E-02					
Rh112	1.50E+00	1.69E-02					
Rh113	2.80E+00	1.83E-02					
Rh114	1.70E+00	1.04E-02					
Rh114*	1.85E+00	1.69E-02					
Rh115	9.90E-01	2.18E-02					
Pd 97	1.86E+02	1.69E-02					
Pd 98	1.06E+03	3.37E-02					
Pd 99	1.28E+03	1.01E-01					
Pd100	3.14E+05	4.89E-01	9.07E+02	5.39E-04	3.92E+03	1.72E-02	8.11E-07
Pd101	3.05E+04	4.05E-01	1.03E+04	3.93E-05	1.86E+02	5.66E-02	9.85E-08
Pd103	1.47E+06	1.22E+00	2.30E+03	5.30E-04	1.57E+03	2.84E-04	7.82E-07
Pd105*	7.00E-11	2.83E-03					
Pd107	2.05E+14	8.61E-08	2.82E+02	3.05E-10	1.28E+04	0.00E+00	4.50E-13
Pd107*	2.13E+01	3.44E-02					
Pd109	4.93E+04	4.10E-01	3.28E+03	1.25E-04	1.10E+03	9.29E-04	1.85E-07
Pd109*	2.81E+02	8.45E-02					
Pd111	1.40E+03	9.69E-02					
Pd111*	1.98E+04	1.69E-02					
Pd112	7.57E+04	1.35E-01					
Pd113	9.30E+01	1.53E-01					
Pd113*	1.00E+02	8.44E-02					
Pd114	1.45E+02	6.11E-02					
Pd115	2.50E+01	3.87E-02					
Pd116	1.18E+01	1.69E-02					
Pd118	1.90E+00	1.69E-02					
Pd122	9.51E-01	3.37E-02					
Ag101	6.66E+02	1.69E-02					
Ag102	7.74E+02	1.50E-01	1.99E+03	7.56E-05	2.89E+01	6.18E-01	2.76E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF ₁ (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Ag102*	4.60E+02	1.35E-01					
Ag103	3.94E+03	3.88E-01	8.12E+03	4.78E-05	5.14E+01	1.36E-01	1.64E-07
Ag103*	5.70E+00	1.35E-01					
Ag104	4.15E+03	5.22E-01	2.47E+03	2.11E-04	5.03E+01	4.88E-01	7.63E-07
Ag104*	2.01E+03	2.53E-01	5.36E+03	4.72E-05	5.14E+01	2.15E-01	1.66E-07
Ag105	3.57E+06	1.03E+00	7.60E+02	1.35E-03	4.48E+03	9.07E-02	2.15E-06
Ag105*	4.34E+02	4.56E-01					
Ag106	1.44E+03	3.89E-01	9.24E+03	4.22E-05	2.85E+01	1.25E-01	1.49E-07
Ag106*	7.31E+05	2.03E-01	5.16E+02	3.94E-04	5.51E+03	5.11E-01	7.65E-07
Ag107*	4.43E+01	1.17E+00					
Ag108	1.42E+02	3.11E-01	3.64E+05	8.55E-07	0.00E+00	3.43E-03	3.15E-09
Ag108*	4.01E+09	7.76E-04	1.27E+01	6.13E-05	2.83E+05	2.89E-01	9.07E-08
Ag109*	3.96E+01	1.41E+00	1.76E+06	7.99E-07	0.00E+00	7.10E-04	2.95E-09
Ag110	2.46E+01	2.29E-01	1.90E+05	1.21E-06	0.00E+00	6.59E-03	4.45E-09
Ag110*	2.16E+07	6.47E-02	4.41E+01	1.47E-03	8.03E+04	5.03E-01	2.22E-06
Ag111	6.44E+05	5.05E-01	5.85E+02	8.63E-04	6.14E+03	4.77E-03	1.28E-06
Ag111*	6.48E+01	3.03E-01					
Ag112	1.13E+04	2.36E-01	3.54E+03	6.68E-05	6.62E+02	1.24E-01	1.50E-07
Ag113	1.93E+04	2.79E-01					
Ag113*	6.87E+01	4.52E-02					
Ag114	4.60E+00	1.45E-01					
Ag114*	1.20E+02	2.80E-07					
Ag115	1.20E+03	2.83E-02	7.91E+03	3.57E-06	7.03E+01	1.34E-01	1.19E-08
Ag115*	1.80E+01	6.11E-02					
Ag116	1.61E+02	5.09E-02					
Ag116*	1.04E+01	1.69E-02					
Ag117	7.36E+01	1.69E-02					
Ag118	3.76E+00	1.88E-02					
Ag118*	2.00E+00	2.53E-02					
Ag119	2.10E+00	1.69E-02					
Ag120	1.23E+00	2.31E-02					
Ag120*	3.20E-01	1.69E-02					
Ag121	7.90E-01	2.02E-05					
Ag122	4.80E-01	3.37E-02					
Ag128	5.80E-02	1.69E-02					
Cd103	4.38E+02	5.06E-02					
Cd104	3.46E+03	2.36E-01	2.03E+04	1.16E-05	5.55E+01	4.22E-02	3.48E-08
Cd105	3.33E+03	4.22E-01					
Cd107	2.34E+04	7.94E-01	3.13E+04	2.54E-05	1.09E+02	2.23E-03	4.06E-08

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _T (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Cd109	4.00E+07	6.90E-01	7.98E+01	8.65E-03	4.51E+04	1.09E-03	1.28E-05
Cd111*	2.92E+03	6.43E-01					
Cd113	2.93E+23	3.39E-17	9.18E+00	3.69E-18	3.92E+05	5.37E-06	5.45E-21
Cd113*	4.45E+08	2.78E-03	9.01E+00	3.08E-04	4.00E+05	2.57E-05	4.54E-07
Cd115	1.92E+05	1.56E-01	8.31E+02	1.88E-04	4.22E+03	4.14E-02	2.88E-07
Cd115*	3.85E+06	1.85E-02	8.39E+01	2.21E-04	4.29E+04	4.33E-03	3.26E-07
Cd116*	1.50E-11	4.78E+03					
Cd117	8.96E+03	1.46E-02	3.59E+03	4.06E-06	4.22E+02	2.02E-01	1.12E-08
Cd117*	1.21E+04	1.93E-02	2.39E+03	8.06E-06	3.89E+02	3.89E-01	2.51E-08
Cd118	3.02E+03	8.44E-02					
Cd119	1.61E+02	1.32E-02					
Cd119*	1.32E+02	2.06E-02					
Cd120	5.08E+01	5.06E-02					
Cd121	1.35E+01	8.23E-05					
Cd121*	4.80E+00	1.43E-09					
Cd122	5.24E+00	3.37E-02					
Cd123	2.10E+00	1.69E-02					
Cd124	1.25E+00	3.37E-02					
Cd125	1.55E+00	2.76E-16					
Cd126	5.15E-01	1.69E-06					
Cd127	3.70E-01	1.20E-03					
Cd128	2.80E-01	1.57E-02					
In107	1.94E+03	8.44E-02					
In107*	5.04E+01	1.69E-02					
In108	3.48E+03	1.35E-01					
In108*	2.38E+03	3.04E-01					
In109	1.51E+04	5.74E-01	8.44E+03	6.80E-05	8.47E+01	1.19E-01	2.21E-07
In109*	8.00E+01	1.35E-01					
In109#	2.10E-01	1.69E-02					
In110	1.76E+04	6.75E-01	2.12E+03	3.18E-04	1.08E+02	5.51E-01	1.13E-06
In110*	4.15E+03	3.04E-01	3.39E+03	8.97E-05	2.51E+02	2.82E-01	2.84E-07
In111	2.45E+05	8.44E-01	3.47E+03	2.43E-04	8.40E+02	6.88E-02	4.61E-07
In111*	4.62E+02	1.86E-01					
In112	8.64E+02	6.08E-01	2.54E+04	2.39E-05	7.62E+00	4.66E-02	8.55E-08
In112*	1.23E+03	3.55E-01					
In113*	5.97E+03	1.07E+00	2.22E+04	4.84E-05	3.34E+01	4.48E-02	1.56E-07
In114	7.19E+01	2.71E-01	2.43E+06	1.11E-07	0.00E+00	5.14E-04	4.10E-10
In114*	4.28E+06	1.05E-01	6.44E+01	1.62E-03	5.59E+04	1.55E-02	2.40E-06
In114#	4.31E-02	1.01E-01					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
In115	1.39E+22	1.01E-15	3.53E+00	2.85E-16	1.02E+06	1.67E-05	4.21E-19
In115*	1.62E+04	3.08E-01	1.76E+04	1.75E-05	1.26E+02	2.73E-02	4.07E-08
In116	1.41E+01	7.28E-02					
In116*	3.25E+03	1.00E-01	2.59E+03	3.87E-05	5.62E+01	4.63E-01	1.39E-07
In116#	2.18E+00	1.01E-01					
In117	2.59E+03	1.28E-01	9.44E+03	1.36E-05	2.89E+01	1.22E-01	4.77E-08
In117*	6.99E+03	1.36E-02	1.84E+04	7.38E-07	1.51E+02	1.55E-02	1.46E-09
In118	2.33E+01	1.35E-01					
In118*	2.67E+02	1.00E-01					
In118#	8.50E+00	6.75E-02					
In119	1.44E+02	7.28E-02	9.03E+03	8.06E-06	0.00E+00	1.38E-01	2.97E-08
In119*	1.08E+03	1.18E-02	8.13E+04	1.46E-07	3.77E+01	2.27E-03	2.62E-10
In120	3.08E+00	8.44E-02					
In120*	4.62E+01	2.96E-07					
In120#	4.73E+01	2.31E-07					
In121	2.31E+01	1.71E-02					
In121*	2.33E+02	1.70E-02					
In122	1.50E+00	3.37E-02					
In122*	1.03E+01	6.49E-08					
In122#	1.08E+01	1.74E-08					
In123	5.98E+00	1.30E-02					
In123*	4.78E+01	3.88E-03					
In124	3.17E+00	3.37E-02					
In124*	2.40E+00	1.26E-08					
In125	2.36E+00	2.70E-12					
In125*	1.22E+01	9.30E-13					
In126	1.45E+00	1.93E-06					
In126*	1.50E+00	1.69E-06					
In127	1.09E+00	7.03E-04					
In127*	3.76E+00	6.01E-04					
In128	8.40E-01	1.56E-02					
Sn108	6.18E+02	6.75E-02					
Sn109	1.08E+03	3.37E-02					
Sn110	1.48E+04	4.72E-01	5.55E+03	8.51E-05	5.03E+02	5.07E-02	1.68E-07
Sn111	2.12E+03	3.71E-01	1.26E+04	2.96E-05	2.55E+01	9.07E-02	1.03E-07
Sn113	9.94E+06	9.21E-01	3.38E+02	2.73E-03	1.07E+04	1.41E-03	4.02E-06
Sn113*	1.28E+03	1.87E-01					
Sn115*	1.59E-04	8.44E-02					
Sn117*	1.18E+06	8.60E-02	8.18E+02	1.05E-04	4.33E+03	2.52E-02	1.59E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _r (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Sn119*	2.53E+07	4.90E-02	5.76E+02	8.51E-05	6.25E+03	3.74E-04	1.26E-07
Sn120*	6.30E-13	2.96E-02					
Sn121	9.73E+04	9.97E-02	7.05E+03	1.41E-05	5.11E+02	8.77E-06	2.09E-08
Sn121*	1.74E+09	3.34E-04	3.13E+02	1.07E-06	1.15E+04	2.23E-04	1.58E-09
Sn123	1.12E+07	3.94E-04	1.11E+02	3.56E-06	3.25E+04	1.49E-03	5.25E-09
Sn123*	2.40E+03	3.33E-02	3.31E+04	1.01E-06	3.89E+01	2.42E-02	2.91E-09
Sn125	8.33E+05	7.30E-07	2.30E+02	3.17E-09	1.55E+04	5.85E-02	4.75E-12
Sn125*	5.71E+02	1.73E-05					
Sn126	7.26E+12	1.61E-11	3.62E+01	4.46E-13	9.95E+04	7.81E-03	6.58E-16
Sn127	7.56E+03	1.14E-04	2.68E+03	4.27E-08	3.24E+02	3.55E-01	1.35E-10
Sn127*	2.48E+02	1.81E-02					
Sn128	3.54E+03	3.24E-02	7.33E+03	4.42E-06	1.72E+02	1.11E-01	1.29E-08
Sn128*	6.50E+00	6.97E-12					
Sn129	1.34E+02	1.12E-11					
Sn129*	4.02E+02	1.43E-11					
Sn130	2.23E+02	1.12E-18					
Sn130*	1.02E+02	8.82E-19					
Sn131	5.60E+01	8.41E-23					
Sb111	7.50E+01	6.75E-02					
Sb112	5.14E+01	1.69E-01					
Sb113	4.00E+02	4.55E-01					
Sb114	2.09E+02	6.07E-01					
Sb115	1.93E+03	8.60E-01	7.49E+03	1.15E-04	2.03E+01	1.60E-01	4.13E-07
Sb116	9.50E+02	9.95E-01	3.08E+03	3.23E-04	1.88E+01	4.00E-01	1.18E-06
Sb116*	3.62E+03	1.01E-01	2.11E+03	4.79E-05	5.33E+01	5.74E-01	1.73E-07
Sb117	1.01E+04	1.28E+00	3.40E+04	3.77E-05	2.10E+01	2.95E-02	1.23E-07
Sb117*	1.00E-08	6.87E-09					
Sb118	2.16E+02	1.42E+00					
Sb118*	1.80E+04	8.44E-02	2.27E+03	3.72E-05	2.35E+02	4.70E-01	1.25E-07
Sb119	1.37E+05	1.77E+00	1.69E+04	1.05E-04	2.11E+02	7.99E-04	1.57E-07
Sb120	9.53E+02	1.69E-01	1.51E+04	1.12E-05	1.10E+01	7.88E-02	4.01E-08
Sb120*	4.98E+05	1.01E-01	6.71E+02	1.51E-04	4.07E+03	4.51E-01	3.04E-07
Sb121*	3.00E-09	4.43E-04					
Sb122	2.33E+05	5.85E-02	6.71E+02	8.71E-05	5.14E+03	7.88E-02	1.37E-07
Sb122*	2.53E+02	9.50E-05					
Sb124	5.20E+06	3.38E-02	1.38E+02	2.45E-04	2.52E+04	3.39E-01	3.82E-07
Sb124*	9.30E+01	2.78E-05	1.99E+04	1.40E-09	0.00E+00	6.29E-02	5.16E-12
Sb124#	1.21E+03	7.52E-06	3.47E+05	2.16E-11	1.04E+01	2.50E-06	3.20E-14
Sb125	8.71E+07	1.52E-02	2.90E+02	5.25E-05	1.22E+04	7.47E-02	7.95E-08

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Sb126	1.07E+06	4.74E-03	2.73E+02	1.74E-05	1.17E+04	5.07E-01	2.99E-08
Sb126*	1.14E+03	3.38E-02	4.35E+03	7.77E-06	2.86E+01	2.78E-01	2.81E-08
Sb126#	1.10E+01	3.38E-02					
Sb127	3.33E+05	1.82E-02	5.64E+02	3.22E-05	6.03E+03	1.23E-01	5.15E-08
Sb128	3.24E+04	1.17E-03	1.09E+03	1.07E-06	1.69E+03	5.59E-01	2.73E-09
Sb128*	6.24E+02	3.24E-02	3.44E+03	9.43E-06	1.45E+01	3.59E-01	3.45E-08
Sb129	1.58E+04	1.91E-08	2.56E+03	7.44E-12	6.44E+02	2.64E-01	1.99E-14
Sb129*	1.06E+03	4.28E-09					
Sb130	2.37E+03	1.08E-08	2.02E+03	5.36E-12	7.96E+01	5.92E-01	1.92E-14
Sb130*	3.78E+02	7.88E-09					
Sb131	1.38E+03	2.93E-16	3.19E+03	9.19E-20	1.31E+02	3.47E-01	3.16E-22
Sb131*	1.00E-08	9.96E-18					
Sb132	1.67E+02	3.42E-20					
Sb132*	1.68E+02	3.42E-20					
Te112	1.20E+02	1.69E-02					
Te114	9.10E+02	5.06E-02					
Te115	3.48E+02	2.02E-01					
Te115*	4.02E+02	3.37E-02					
Te116	8.96E+03	6.24E-01	1.44E+04	4.34E-05	2.26E+02	8.47E-03	7.34E-08
Te117	3.72E+03	7.59E-01					
Te117*	1.03E-01	1.35E-01					
Te118	5.18E+05	1.10E+00					
Te119	5.78E+04	1.11E+00					
Te119*	4.05E+05	2.53E-01					
Te121	1.45E+06	1.80E+00	1.64E+03	1.09E-03	1.91E+03	9.99E-02	1.93E-06
Te121*	1.33E+07	1.23E-01	2.42E+02	5.08E-04	1.48E+04	3.66E-02	7.57E-07
Te123	3.91E+20	2.06E-13	7.43E+02	2.77E-16	4.85E+03	7.96E-04	4.09E-19
Te123*	1.03E+07	5.15E-02	3.38E+02	1.52E-04	1.06E+04	2.41E-02	2.27E-07
Te125*	5.01E+06	3.98E-02	4.94E+02	8.05E-05	7.29E+03	1.68E-03	1.19E-07
Te127	3.37E+04	6.77E-02	1.12E+04	6.03E-06	3.18E+02	8.95E-04	9.00E-09
Te127*	9.42E+06	1.93E-02	1.68E+02	1.15E-04	2.15E+04	5.44E-04	1.70E-07
Te128*	3.20E-09	3.59E-05					
Te129	4.18E+03	2.45E-05	3.38E+04	7.27E-10	7.73E+01	1.02E-02	1.51E-12
Te129*	2.90E+06	5.60E-06	1.50E+02	3.73E-08	2.39E+04	5.74E-03	5.50E-11
Te130*	2.30E-12	5.13E-04					
Te131	1.50E+03	1.91E-06	5.33E+03	3.59E-10	4.59E+02	7.55E-02	7.85E-13
Te131*	1.08E+05	2.42E-07	5.04E+02	4.81E-10	6.40E+03	2.59E-01	8.21E-13
Te132	2.77E+05	3.23E-11	3.77E+02	8.57E-14	9.44E+03	3.81E-02	1.29E-16
Te133	7.50E+02	3.54E-11	6.22E+03	5.69E-15	8.84E+01	1.70E-01	1.91E-17

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Te133*	3.32E+03	2.45E-11	2.22E+03	1.10E-14	4.07E+02	4.22E-01	3.45E-17
Te134	2.51E+03	3.78E-18	6.30E+03	5.99E-22	1.20E+02	1.57E-01	1.93E-24
Te135	1.90E+01	1.22E-18					
I 117	1.38E+02	2.19E-01					
I 118	8.20E+02	1.86E-01					
I 118*	5.10E+02	5.06E-02					
I 119	1.15E+03	8.77E-01					
I 120	4.86E+03	8.44E-01	1.88E+03	4.49E-04	4.44E+02	5.11E-01	1.42E-06
I 120*	3.18E+03	1.69E-02	1.17E+03	1.45E-05	2.65E+02	9.81E-01	5.06E-08
I 121	7.63E+03	1.55E+00	1.11E+04	1.40E-04	1.19E+02	7.18E-02	4.04E-07
I 122	2.18E+02	1.65E+00	7.41E+03	2.23E-04	0.00E+00	1.69E-01	8.23E-07
I 123	4.75E+04	2.56E+00	9.63E+03	2.66E-04	2.96E+02	2.69E-02	5.15E-07
I 124	3.61E+05	5.57E-01	1.81E+02	3.08E-03	1.94E+04	1.99E-01	4.74E-06
I 125	5.20E+06	3.69E+00	1.49E+02	2.47E-02	2.42E+04	1.93E-03	3.65E-05
I 126	1.12E+06	3.37E-01	8.07E+01	4.17E-03	4.44E+04	7.96E-02	6.20E-06
I 128	1.50E+03	1.54E-01	3.93E+04	3.93E-06	4.74E+01	1.54E-02	1.00E-08
I 129	4.95E+14	1.18E-12	2.08E+01	5.66E-14	1.74E+05	1.41E-03	8.36E-17
I 130	4.45E+04	2.83E-02	9.60E+02	2.95E-05	2.64E+03	3.85E-01	6.28E-08
I 130*	5.40E+02	3.37E-02					
I 131	6.93E+05	1.60E-05	1.09E+02	1.47E-07	3.29E+04	6.73E-02	2.19E-10
I 132	8.26E+03	1.46E-02	2.29E+03	6.40E-06	3.81E+02	4.14E-01	2.02E-08
I 132*	5.02E+03	1.69E-02	7.78E+03	2.17E-06	3.00E+02	5.66E-02	4.89E-09
I 133	7.49E+04	1.69E-02	5.85E+02	2.88E-05	5.85E+03	1.09E-01	4.58E-08
I 133*	9.00E+00	1.69E-02					
I 134	3.15E+03	7.03E-08	2.37E+03	2.96E-11	1.31E+02	4.81E-01	1.03E-13
I 134*	2.21E+02	9.17E-09					
I 135	2.37E+04	6.60E-12	1.73E+03	3.81E-15	1.23E+03	2.95E-01	9.07E-18
I 136	8.34E+01	1.71E-13					
I 136*	4.69E+01	1.71E-13					
I 138	6.23E+00	1.69E-02					
Xe119	3.48E+02	3.37E-02					
Xe120	2.40E+03	1.69E-01	1.74E+04	9.69E-06	0.00E+00	7.18E-02	7.14E-06
Xe121	2.41E+03	2.70E-01	3.70E+03	7.30E-05	0.00E+00	3.38E-01	5.39E-05
Xe122	7.24E+04	7.59E-01	1.37E+05	5.53E-06	0.00E+00	9.10E-03	4.08E-06
Xe123	7.49E+03	1.59E+00	1.11E+04	1.42E-04	0.00E+00	1.12E-01	1.05E-04
Xe125	6.08E+04	3.31E+00	2.84E+04	1.17E-04	0.00E+00	4.40E-02	8.60E-05
Xe125*	5.70E+01	1.47E-01					
Xe127	3.15E+06	6.34E+00	2.70E+04	2.35E-04	0.00E+00	4.63E-02	1.73E-04
Xe127*	6.92E+01	1.90E-01					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target		
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0	

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _r (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Xe129*	7.68E+05	4.77E-02	3.19E+05	1.50E-07	0.00E+00	3.92E-03	1.10E-07
Xe131*	1.03E+06	1.46E-02	8.68E+05	1.68E-08	0.00E+00	1.44E-03	1.24E-08
Xe133	4.53E+05	3.38E-02	2.17E+05	1.56E-07	0.00E+00	5.77E-03	1.15E-07
Xe133*	1.89E+05	4.96E-04	2.47E+05	2.01E-09	0.00E+00	5.07E-03	1.48E-09
Xe134*	2.90E-01	1.66E-06					
Xe135	3.29E+04	2.18E-07	2.84E+04	7.68E-12	0.00E+00	4.40E-02	5.66E-12
Xe135*	9.17E+02	6.01E-08	1.66E+04	3.63E-12	0.00E+00	7.55E-02	2.68E-12
Xe137	2.29E+02	9.21E-04					
Xe138	8.45E+02	1.59E-02	5.86E+03	2.72E-06	0.00E+00	2.13E-01	2.01E-06
Xe139	3.97E+01	1.29E-14					
Xe140	1.36E+01	1.69E-02					
Cs120	6.06E+01	1.69E-02					
Cs121*	1.20E+02	8.44E-02					
Cs122	2.10E+01	2.70E-01					
Cs122*	2.70E+02	1.69E-02					
Cs122#	3.60E-01	1.35E-01					
Cs123	3.52E+02	1.18E+00					
Cs123*	1.60E+00	3.54E-01					
Cs124	3.08E+01	1.99E+00					
Cs124*	6.30E+00	2.02E-01					
Cs125	2.70E+03	2.77E+00	9.36E+03	2.96E-04	4.14E+01	1.19E-01	1.02E-06
Cs126	9.84E+01	5.63E+00	6.45E+03	8.74E-04	0.00E+00	1.94E-01	3.22E-06
Cs127	2.25E+04	6.09E+00	1.36E+04	4.47E-04	5.88E+01	7.14E-02	1.43E-06
Cs128	2.17E+02	8.64E+00	7.82E+03	1.10E-03	0.00E+00	1.60E-01	4.07E-06
Cs129	1.15E+05	9.11E+00	1.24E+04	7.36E-04	1.59E+02	4.59E-02	1.83E-06
Cs130	1.79E+03	2.37E-01	1.24E+04	1.91E-05	2.99E+01	9.07E-02	6.62E-08
Cs130*	2.08E+02	8.44E-02					
Cs131	8.37E+05	1.25E+01	2.12E+04	5.89E-04	1.67E+02	1.21E-03	8.95E-07
Cs132	5.59E+05	3.75E-02	2.27E+03	1.65E-05	1.23E+03	1.24E-01	3.26E-08
Cs134	6.51E+07	7.71E-03	7.66E+01	1.01E-04	4.63E+04	2.80E-01	1.52E-07
Cs134*	1.05E+04	6.59E-04	6.76E+04	9.75E-09	4.37E+01	3.35E-03	1.83E-11
Cs135	7.26E+13	7.27E-09	7.92E+02	9.19E-12	4.55E+03	2.09E-06	1.36E-14
Cs135*	3.18E+03	1.69E-02	4.23E+03	4.00E-06	2.47E+01	2.87E-01	1.45E-08
Cs136	1.14E+06	5.23E-05	4.26E+02	1.23E-07	7.33E+03	3.92E-01	2.17E-10
Cs136*	1.90E+01	1.56E-05					
Cs137	9.52E+08	2.97E-05	1.13E+02	2.63E-07	3.19E+04	2.86E-05	3.88E-10
Cs138	2.00E+03	1.59E-02	2.59E+03	6.16E-06	1.01E+02	4.48E-01	2.17E-08
Cs138*	1.75E+02	7.54E-08					
Cs139	5.56E+02	8.07E-11					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Cs140	6.37E+01	1.69E-02					
Cs141	2.48E+01	1.27E-24					
Cs142	1.69E+00	2.39E-23					
Ba123	1.62E+02	3.04E-01					
Ba124	7.10E+02	1.16E+00					
Ba125	2.10E+02	1.54E+00					
Ba126	6.00E+03	4.50E+00	8.15E+03	5.53E-04	3.67E+02	2.60E-02	1.02E-06
Ba127	7.62E+02	4.89E+00					
Ba128	2.10E+05	7.96E+00	1.18E+03	6.77E-03	3.03E+03	1.06E-02	1.01E-05
Ba129	8.00E+03	6.75E+00					
Ba129*	7.81E+03	1.77E+00					
Ba130*	1.10E-02	1.35E-01					
Ba131	1.02E+06	1.23E+01	4.03E+03	3.06E-03	6.70E+02	7.77E-02	6.20E-06
Ba131*	8.76E+02	4.87E-01	9.73E+04	5.01E-06	4.63E+00	1.12E-02	1.71E-08
Ba133	3.32E+08	1.73E+00	4.50E+02	3.85E-03	7.81E+03	6.59E-02	5.88E-06
Ba133*	1.40E+05	2.00E-01	5.55E+03	3.60E-05	6.22E+02	9.69E-03	5.65E-08
Ba135*	1.03E+05	3.83E-02	6.82E+03	5.62E-06	5.03E+02	8.58E-03	8.87E-09
Ba136*	3.08E-01	9.04E-04					
Ba137*	1.53E+02	1.24E-04	1.17E+04	1.05E-08	0.00E+00	1.07E-01	3.89E-11
Ba139	4.99E+03	4.52E-05	1.85E+04	2.44E-09	1.72E+02	8.03E-03	4.25E-12
Ba140	1.10E+06	1.69E-02	9.41E+02	1.79E-05	3.74E+03	3.17E-02	2.74E-08
Ba141	1.10E+03	9.85E-08	6.87E+03	1.43E-11	8.07E+01	1.54E-01	4.80E-14
Ba142	6.36E+02	1.81E-13	6.10E+03	2.97E-17	4.11E+01	1.91E-01	1.05E-19
Ba143	1.45E+01	1.62E-16					
Ba144	1.15E+01	7.89E-26					
La124	3.00E+01	1.69E-02					
La125	7.60E+01	3.37E-02					
La126	6.00E+01	4.55E-01					
La127	2.30E+02	1.42E+00					
La128	3.00E+02	3.00E+00					
La129	6.96E+02	5.42E+00					
La129*	5.60E-01	1.48E+00					
La130	5.22E+02	8.52E+00					
La131	3.54E+03	1.09E+01	9.58E+03	1.14E-03	4.11E+01	1.16E-01	3.93E-06
La132	1.73E+04	1.67E+01	2.28E+03	7.34E-03	5.14E+02	3.70E-01	2.18E-05
La132*	1.46E+03	2.02E+00					
La133	1.41E+04	1.90E+01					
La134	3.87E+02	2.84E+01	1.01E+04	2.82E-03	0.00E+00	1.24E-01	1.04E-05
La135	7.02E+04	2.77E+01	5.22E+04	5.31E-04	5.92E+01	3.41E-03	9.50E-07

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target
 Identification No.: CN-LANSCE-LFO-07-002 | Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
La136	5.92E+02	3.88E-01					
La136*	1.14E-01	2.10E-03					
La137	1.89E+12	7.71E-04	1.55E+02	4.96E-06	2.32E+04	1.50E-03	7.32E-09
La138	3.31E+18	1.52E-12	1.01E+01	1.51E-13	3.56E+05	2.29E-01	2.23E-16
La140	1.45E+05	3.94E-02	5.91E+02	6.66E-05	4.85E+03	4.33E-01	1.28E-07
La141	1.41E+04	5.54E-07	6.13E+03	9.04E-11	5.62E+02	8.84E-03	1.42E-13
La142	5.47E+03	4.25E-10	2.07E+03	2.05E-13	2.04E+02	5.33E-01	7.04E-16
La143	8.52E+02	6.14E-11	3.13E+04	1.96E-15	5.99E+01	1.92E-02	4.98E-18
La144	4.08E+01	1.71E-12					
La145	2.48E+01	1.68E-18					
La146	6.27E+00	1.01E-19					
Ce127	3.20E+01	1.52E-01					
Ce128	7.20E+02	5.90E-01					
Ce129	2.10E+02	1.03E+00					
Ce130	1.50E+03	4.44E+00					
Ce131	6.00E+02	3.95E+00					
Ce131*	3.00E+02	1.60E+00					
Ce132	1.26E+04	1.31E+01					
Ce133	1.76E+04	1.08E+01					
Ce133*	5.82E+03	5.16E+00					
Ce134	2.73E+05	2.68E+01	4.40E+02	6.08E-02	8.18E+03	1.74E-03	8.98E-05
Ce135	6.37E+04	2.68E+01	1.44E+03	1.86E-02	1.59E+03	3.16E-01	4.23E-05
Ce135*	2.00E+01	1.97E+00					
Ce136*	1.00E-08	2.30E-04					
Ce137	3.24E+04	4.69E+01	7.04E+04	6.66E-04	4.18E+01	3.26E-03	1.25E-06
Ce137*	1.24E+05	6.56E-01	2.51E+03	2.61E-04	1.41E+03	7.25E-03	3.94E-07
Ce138*	8.65E-03	2.02E-01					
Ce139	1.19E+07	6.28E+01	3.94E+02	1.59E-01	9.07E+03	2.49E-02	2.38E-04
Ce139*	5.48E+01	1.30E-01					
Ce141	2.81E+06	7.83E-03	4.01E+02	1.95E-05	8.95E+03	1.27E-02	2.90E-08
Ce142	1.58E+24	6.68E-22					
Ce143	1.19E+05	1.69E-02	1.02E+03	1.65E-05	3.39E+03	4.77E-02	2.58E-08
Ce144	2.46E+07	1.18E-07	9.64E+00	1.22E-08	3.74E+05	3.16E-03	1.81E-11
Ce145	1.81E+02	2.49E-08					
Ce146	8.11E+02	5.94E-11					
Ce147	5.64E+01	1.72E-14					
Ce148	5.60E+01	3.37E-02					
Ce149	5.30E+00	8.62E-17					
Ce158	1.59E-01	1.69E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _T (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Pr129	2.40E+01	1.18E-01					
Pr130	4.00E+01	1.69E-01					
Pr131	1.02E+02	9.95E-01					
Pr132	1.08E+02	3.59E+00					
Pr133	3.90E+02	7.76E+00					
Pr134	1.02E+03	1.62E+01					
Pr134*	6.60E+02	4.05E-01					
Pr135	1.44E+03	2.21E+01					
Pr136	7.86E+02	4.10E+01	3.21E+03	1.28E-02	2.47E+01	3.81E-01	4.65E-05
Pr137	4.61E+03	4.48E+01	1.20E+04	3.72E-03	4.77E+01	8.73E-02	1.24E-05
Pr138	8.70E+01	5.42E+01	8.62E+03	6.29E-03	0.00E+00	1.45E-01	2.32E-05
Pr138*	7.60E+03	1.79E+00	2.53E+03	7.08E-04	1.35E+02	4.48E-01	2.46E-06
Pr139	1.59E+04	6.77E+01	3.19E+04	2.12E-03	5.77E+01	1.91E-02	5.42E-06
Pr140	2.03E+02	8.51E+01					
Pr142	6.88E+04	2.32E-01	1.24E+03	1.88E-04	2.88E+03	1.17E-02	2.82E-07
Pr142*	8.76E+02	5.03E-02	9.76E+04	5.16E-07	3.69E+01	0.00E+00	7.60E-10
Pr143	1.17E+06	6.76E-02	4.45E+02	1.52E-04	8.10E+03	7.77E-05	2.24E-07
Pr144	1.04E+03	1.69E-02	5.62E+04	3.01E-07	4.33E+01	7.22E-03	6.59E-10
Pr144*	4.32E+02	1.69E-02	1.21E+06	1.40E-08	0.00E+00	1.03E-03	5.15E-11
Pr145	2.15E+04	2.09E-06	5.29E+03	3.96E-10	6.73E+02	2.72E-03	5.94E-13
Pr146	1.45E+03	1.69E-02					
Pr147	8.04E+02	2.60E-08	7.62E+03	3.41E-12	3.04E+01	1.54E-01	1.21E-14
Pr148	1.36E+02	3.37E-02					
Pr148*	1.20E+02	7.23E-09					
Pr149	1.36E+02	2.54E-12					
Pr150	6.19E+00	1.21E-14					
Pr157	1.60E-01	6.09E-04					
Pr158	1.21E-01	1.63E-02					
Nd130	2.80E+01	1.69E-02					
Nd131	2.40E+01	3.37E-02					
Nd132	1.08E+02	5.74E-01					
Nd133	7.20E+01	1.89E+00					
Nd134	5.10E+02	7.32E+00					
Nd135	7.40E+02	4.93E+00					
Nd135*	3.30E+02	4.32E+00					
Nd136	3.04E+03	3.24E+01	1.44E+04	2.26E-03	1.15E+02	4.70E-02	6.02E-06
Nd137	2.31E+03	3.72E+01					
Nd137*	1.60E+00	1.07E+01					
Nd138	1.81E+04	5.16E+01	3.46E+03	1.49E-02	1.03E+03	4.70E-03	2.24E-05

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _r (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Nd139	1.78E+03	5.78E+01	1.61E+04	3.59E-03	2.12E+01	7.03E-02	1.25E-05
Nd139*	1.98E+04	8.22E+00	3.03E+03	2.71E-03	3.74E+02	2.82E-01	8.10E-06
Nd140	2.91E+05	8.39E+01					
Nd140*	1.00E-08	2.21E-04					
Nd141	8.96E+03	8.54E+01	8.79E+04	9.71E-04	1.03E+01	1.07E-02	3.04E-06
Nd141*	6.24E+01	2.69E+00	9.13E+03	2.95E-04	0.00E+00	1.37E-01	1.09E-06
Nd144	6.60E+22	1.71E-15					
Nd145	1.89E+24	2.39E-17					
Nd147	9.49E+05	1.90E-04	5.21E+02	3.65E-07	6.85E+03	2.29E-02	5.46E-10
Nd149	6.22E+03	1.69E-02	8.64E+03	1.96E-06	2.24E+02	6.70E-02	4.90E-09
Nd151	7.46E+02	5.77E-11	7.08E+03	8.15E-15	3.12E+01	1.66E-01	2.89E-17
Nd152	6.84E+02	2.77E-12					
Nd153	3.16E+01	1.92E-14					
Nd156	5.49E+00	5.33E-05					
Nd157	5.04E-01	2.48E-03					
Nd158	1.26E+00	1.43E-02					
Pm132	6.00E+00	1.69E-02					
Pm133	1.20E+01	1.69E-02					
Pm134	2.40E+01	4.72E-01					
Pm135	4.90E+01	7.25E-01					
Pm136	1.07E+02	3.96E+00					
Pm137	1.44E+02	8.72E+00					
Pm138	1.00E+01	5.65E+00					
Pm138*	1.94E+02	1.49E+01					
Pm139	2.49E+02	4.22E+01					
Pm139*	1.80E-01	1.12E+01					
Pm140	9.20E+00	4.68E+01					
Pm140*	3.57E+02	1.57E+01					
Pm141	1.25E+03	7.64E+01	8.67E+03	8.81E-03	3.17E+01	1.33E-01	3.10E-05
Pm142	4.05E+01	1.05E+02	8.01E+03	1.31E-02	0.00E+00	1.56E-01	4.82E-05
Pm142*	6.70E-05	6.66E+00					
Pm143	2.29E+07	8.22E+01	3.26E+02	2.52E-01	1.09E+04	5.40E-02	3.79E-04
Pm144	3.14E+07	5.17E+00	6.62E+01	7.82E-02	5.37E+04	2.77E-01	1.18E-04
Pm145	5.59E+08	3.57E+00	1.18E+02	3.02E-02	3.05E+04	2.62E-03	4.46E-05
Pm146	1.75E+08	2.38E-01	2.45E+01	9.71E-03	1.47E+05	1.33E-01	1.44E-05
Pm147	8.28E+07	2.46E-01	9.18E+01	2.67E-03	3.92E+04	2.56E-06	3.94E-06
Pm148	4.64E+05	3.27E-02	3.21E+02	1.02E-04	1.09E+04	1.07E-01	1.56E-07
Pm148*	3.57E+06	6.97E-02	1.53E+02	4.57E-04	2.26E+04	3.58E-01	7.18E-07
Pm149	1.91E+05	4.35E-02	1.23E+03	3.55E-05	2.93E+03	2.00E-03	5.25E-08

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the IL Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Pm149*	1.00E-08	4.75E-03					
Pm150	9.65E+03	3.43E-02	3.20E+03	1.07E-05	3.62E+02	2.65E-01	3.19E-08
Pm151	1.02E+05	1.69E-02	1.88E+03	8.96E-06	1.75E+03	5.59E-02	1.49E-08
Pm152	2.46E+02	4.12E-07					
Pm152*	4.51E+02	1.04E-06					
Pm152#	1.08E+03	3.53E-07					
Pm153	3.15E+02	4.45E-08					
Pm154	1.03E+02	9.64E-11					
Pm154*	1.61E+02	9.41E-11					
Pm155	4.15E+01	3.13E-12					
Pm156	2.67E+01	5.33E-05					
Pm157	1.06E+01	2.48E-03					
Pm158	4.80E+00	1.43E-02					
Sm136	4.27E+01	1.69E-02					
Sm137	4.50E+01	5.40E-01					
Sm138	1.80E+02	2.53E+00					
Sm139	1.54E+02	6.41E+00					
Sm139*	1.07E+01	2.99E+00					
Sm140	8.89E+02	2.07E+01					
Sm141	6.12E+02	1.74E+01	4.72E+03	3.68E-03	3.07E+01	2.54E-01	1.32E-05
Sm141*	1.36E+03	1.36E+01	3.29E+03	4.14E-03	5.85E+01	3.59E-01	1.48E-05
Sm142	4.35E+03	6.97E+01	1.41E+04	4.95E-03	2.15E+02	1.40E-02	9.03E-06
Sm143	5.30E+02	8.77E+01					
Sm143*	6.60E+01	1.54E+01					
Sm143#	3.00E-02	1.69E+00					
Sm145	2.94E+07	1.05E+02	3.26E+02	3.23E-01	1.10E+04	5.96E-03	4.77E-04
Sm146	3.25E+15	1.91E-06	4.37E-02	4.38E-05	8.25E+07	0.00E+00	6.46E-08
Sm147	3.35E+18	1.56E-09	4.82E-02	3.24E-08	7.47E+07	0.00E+00	4.78E-11
Sm148	2.50E+23	2.85E-15					
Sm149	6.31E+22	5.23E-14					
Sm151	2.84E+09	2.29E-03	1.20E+02	1.91E-05	3.00E+04	1.34E-07	2.81E-08
Sm153	1.67E+05	1.28E-01	1.81E+03	7.07E-05	1.96E+03	8.44E-03	1.06E-07
Sm155	1.34E+03	1.69E-02	4.82E+04	3.50E-07	2.51E+01	1.72E-02	1.03E-09
Sm156	3.38E+04	5.33E-05	4.76E+03	1.12E-08	6.99E+02	2.01E-02	1.84E-11
Sm157	4.82E+02	2.48E-03					
Sm158	3.18E+02	1.43E-02					
Sm159	1.14E+01	2.10E-15					
Eu138	1.21E+01	1.69E-02					
Eu139	1.79E+01	2.19E-01					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Eu140	1.54E+00	3.04E-01					
Eu140*	2.00E+01	8.44E-02					
Eu141	4.00E+01	1.70E+00					
Eu141*	2.70E+00	1.89E+00					
Eu142	2.40E+00	8.54E+00					
Eu142*	7.32E+01	4.39E+00					
Eu143	1.58E+02	3.57E+01					
Eu144	1.02E+01	7.41E+01					
Eu145	5.12E+05	1.41E+02	1.03E+03	1.38E-01	2.74E+03	2.67E-01	2.70E-04
Eu146	3.97E+05	2.06E+02	6.93E+02	2.98E-01	3.89E+03	4.55E-01	6.05E-04
Eu147	2.07E+06	1.75E+02	9.53E+02	1.84E-01	3.53E+03	8.58E-02	2.98E-04
Eu148	4.71E+06	2.14E+01	2.33E+02	9.20E-02	1.43E+04	3.92E-01	1.51E-04
Eu149	8.04E+06	2.34E+02	1.89E+03	1.24E-01	1.89E+03	8.33E-03	1.86E-04
Eu150	1.13E+09	1.16E-01	1.34E+01	8.63E-03	2.68E+05	2.65E-01	1.28E-05
Eu150*	4.54E+04	2.03E+00	5.17E+03	3.92E-04	6.73E+02	8.18E-03	6.08E-07
Eu152	4.21E+08	5.97E-01	1.63E+01	3.67E-02	2.21E+05	2.09E-01	5.43E-05
Eu152*	3.36E+04	1.11E+01	3.72E+03	2.99E-03	8.18E+02	5.25E-02	5.44E-06
Eu152#	5.76E+03	1.06E-01					
Eu154	2.71E+08	1.81E-01	1.26E+01	1.44E-02	2.86E+05	2.27E-01	2.13E-05
Eu154*	2.76E+03	5.55E-01					
Eu155	1.50E+08	1.17E-02	8.69E+01	1.35E-04	4.14E+04	9.21E-03	1.99E-07
Eu156	1.31E+06	3.39E-02	2.43E+02	1.40E-04	1.41E+04	2.50E-01	2.21E-07
Eu157	5.46E+04	1.94E-02	2.91E+03	6.67E-06	1.11E+03	4.33E-02	1.13E-08
Eu158	2.75E+03	1.43E-02	5.49E+03	2.61E-06	9.40E+01	1.95E-01	8.80E-09
Eu159	1.09E+03	2.24E-09					
Eu160	3.80E+01	1.13E-11					
Gd142	9.00E+01	9.45E-01					
Gd143	3.90E+01	1.05E+00					
Gd143*	1.12E+02	1.18E+00					
Gd144	2.70E+02	8.96E+00					
Gd145	1.38E+03	4.50E+01	2.85E+03	1.58E-02	3.85E+01	4.26E-01	5.72E-05
Gd145*	8.50E+01	1.59E+01					
Gd146	4.17E+06	1.54E+02	1.61E+02	9.59E-01	2.23E+04	3.68E-02	1.42E-03
Gd147	1.37E+05	1.35E+02	1.64E+03	8.22E-02	1.51E+03	2.39E-01	1.78E-04
Gd148	2.35E+09	2.30E+00	4.09E-02	5.61E+01	8.81E+07	0.00E+00	8.28E-02
Gd149	8.10E+05	2.37E+02	1.45E+03	1.64E-01	2.29E+03	7.10E-02	2.72E-04
Gd150	5.65E+13	1.08E-04					
Gd151	1.07E+07	2.10E+02	8.00E+02	2.63E-01	4.48E+03	8.14E-03	3.91E-04
Gd152	3.41E+21	2.72E-12	5.56E-02	4.89E-11	6.48E+07	0.00E+00	7.21E-14

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Gd153	2.09E+07	1.89E+02	3.79E+02	4.99E-01	9.47E+03	1.37E-02	7.40E-04
Gd155*	3.10E-02	6.75E-02					
Gd159	6.65E+04	1.77E-03	3.60E+03	4.91E-07	9.77E+02	8.18E-03	7.49E-10
Gd161	2.19E+02	9.41E-06					
Gd162	5.04E+02	3.29E-09					
Gd163	6.80E+01	3.99E-09					
Gd164	4.50E+01	1.10E-13					
Gd165	1.03E+01	1.29E-17					
Tb144	1.00E+00	1.69E-02					
Tb145	2.95E+01	2.70E-01					
Tb146	8.00E+00	1.70E+00					
Tb146*	2.30E+01	2.35E+00					
Tb147	5.90E+03	3.15E+01	3.47E+03	9.07E-03	2.08E+02	2.88E-01	2.94E-05
Tb147*	1.10E+02	1.60E+01					
Tb148	3.60E+03	9.63E+01					
Tb148*	1.32E+02	1.30E+01					
Tb149	1.49E+04	1.22E+02	4.40E+02	2.78E-01	7.33E+03	2.97E-01	4.74E-04
Tb149*	2.50E+02	3.48E+01					
Tb150	1.25E+04	1.27E+02	3.02E+03	4.21E-02	3.12E+02	3.06E-01	1.31E-04
Tb150*	3.48E+02	2.77E+01					
Tb151	6.34E+04	2.03E+02	3.36E+03	6.05E-02	6.25E+02	1.55E-01	1.45E-04
Tb151*	2.50E+01	3.96E+01					
Tb152	6.30E+04	2.78E+02					
Tb152*	2.58E+02	1.75E+01					
Tb153	2.02E+05	2.74E+02	4.19E+03	6.54E-02	7.55E+02	3.66E-02	1.14E-04
Tb154	7.74E+04	2.35E+00	1.46E+03	1.62E-03	1.18E+03	4.48E-01	4.25E-06
Tb154*	3.24E+04	5.04E+00					
Tb154#	8.17E+04	1.56E+01					
Tb155	4.60E+05	3.60E+02	4.31E+03	8.37E-02	7.77E+02	2.06E-02	1.37E-04
Tb156	4.62E+05	5.16E+00	7.28E+02	7.09E-03	4.00E+03	3.31E-01	1.35E-05
Tb156*	1.91E+04	5.84E-01	1.65E+04	3.53E-05	2.17E+02	4.29E-04	5.25E-08
Tb156#	8.80E+04	5.39E-01	4.68E+03	1.15E-04	7.62E+02	2.87E-03	1.73E-07
Tb157	4.73E+09	2.66E+00	3.91E+02	6.80E-03	9.21E+03	2.51E-04	1.00E-05
Tb158	4.73E+09	7.34E-02	1.41E+01	5.22E-03	2.56E+05	1.42E-01	7.71E-06
Tb158*	1.05E+01	4.03E+00					
Tb158#	3.95E-04	1.35E-01					
Tb160	6.25E+06	3.06E+00	1.41E+02	2.17E-02	2.50E+04	2.05E-01	3.31E-05
Tb161	5.97E+05	3.12E-02	1.05E+03	2.96E-05	3.40E+03	3.77E-03	4.38E-08
Tb162	4.56E+02	3.22E-04					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Tb163	1.17E+03	8.87E-06					
Tb164	1.80E+02	2.97E-06					
Tb165	1.27E+02	8.63E-10					
Tb166	2.56E+01	1.52E-13					
Dy146	2.90E+01	2.87E-01					
Dy147	7.50E+01	1.58E+00					
Dy147*	5.90E+01	7.93E-01					
Dy148	1.86E+02	4.63E+01					
Dy149	2.54E+02	7.23E+01					
Dy150	4.30E+02	1.21E+02					
Dy151	1.07E+03	1.32E+02					
Dy152	8.53E+03	2.27E+02					
Dy153	2.30E+04	2.29E+02					
Dy154	9.47E+13	1.05E-04					
Dy155	3.60E+04	3.46E+02	6.96E+03	4.97E-02	2.22E+02	1.02E-01	1.36E-04
Dy156	3.16E+25	3.91E-16					
Dy157	2.93E+04	4.17E+02	1.42E+04	2.94E-02	7.99E+01	6.03E-02	8.78E-05
Dy157*	2.02E-02	1.89E+00					
Dy159	1.25E+07	4.57E+02	1.48E+03	3.10E-01	2.43E+03	4.63E-03	4.60E-04
Dy159*	1.22E-04	4.72E-01					
Dy165	8.40E+03	3.00E-01	2.45E+04	1.22E-05	1.34E+02	4.44E-03	2.04E-08
Dy165*	7.55E+01	1.88E-01					
Dy166	2.94E+05	1.21E-05	4.81E+02	2.51E-08	7.47E+03	5.18E-03	3.71E-11
Dy167	3.72E+02	9.50E-08					
Dy168	5.22E+02	1.40E-10					
Dy169	3.90E+01	1.44E-10					
Dy170	6.74E+01	5.74E-14					
Dy171	1.33E+00	1.15E-14					
Ho148*	9.00E+00	1.69E-02					
Ho149	5.80E+01	2.78E+00					
Ho150	8.80E+01	1.02E+01					
Ho150*	2.60E+01	2.24E+00					
Ho151	3.52E+01	1.81E+01					
Ho151*	4.72E+01	1.20E+01					
Ho152	1.62E+02	7.30E+01					
Ho152*	4.95E+01	1.04E+01					
Ho153	1.20E+02	8.20E+01					
Ho153*	5.60E+02	4.05E+01					
Ho154	7.10E+02	1.84E+02					

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 Identification No.: CN-LANSCE-LFO-07-002 Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF ₁ (rem/Ci)	DCF ₅ (rem·m ³ /(Ci·s))	MEOI dose (rem)
Ho154*	1.95E+02	3.35E+01					
Ho155	2.88E+03	2.87E+02	1.53E+04	1.87E-02	4.48E+01	6.62E-02	6.12E-05
Ho156	3.36E+03	3.49E+02					
Ho157	7.56E+02	3.88E+02	1.48E+04	2.63E-02	5.22E+00	8.29E-02	9.57E-05
Ho158	6.60E+02	4.87E+02					
Ho158*	1.62E+03	3.05E+01					
Ho158#	1.28E+03	5.28E+00					
Ho159	1.98E+03	4.96E+02	2.03E+04	2.44E-02	6.51E+00	5.92E-02	8.79E-05
Ho159*	8.30E+00	9.68E+00					
Ho160	1.54E+03	5.75E+02					
Ho160*	1.81E+04	1.23E+01					
Ho160#	3.00E+00	4.69E+00					
Ho161	8.93E+03	6.09E+02	1.06E+05	5.75E-03	1.55E+01	6.40E-03	1.54E-05
Ho161*	6.73E+00	7.49E+00					
Ho162	9.00E+02	4.77E+00	4.46E+04	1.07E-04	2.35E+00	2.72E-02	3.87E-07
Ho162*	4.02E+03	2.41E+00	1.14E+04	2.12E-04	2.52E+01	1.01E-01	7.45E-07
Ho163	1.44E+11	1.49E-01					
Ho163*	1.09E+00	1.32E+00					
Ho164	1.74E+03	1.66E+01	1.96E+05	8.45E-05	8.70E+00	3.35E-03	2.23E-07
Ho164*	2.25E+03	6.50E+00	1.09E+05	5.97E-05	1.90E+01	4.88E-03	1.44E-07
Ho166	9.66E+04	1.21E+01	1.14E+03	1.06E-02	3.14E+03	5.25E-03	1.57E-05
Ho166*	3.79E+10	2.91E-04	4.65E+00	6.25E-05	7.73E+05	3.13E-01	9.24E-08
Ho167	1.12E+04	7.38E-02	1.23E+04	6.01E-06	1.09E+02	6.40E-02	1.72E-08
Ho168	1.79E+02	1.69E-02					
Ho169	2.82E+02	5.06E-02					
Ho170	1.68E+02	2.39E-07					
Ho170*	4.30E+01	2.39E-07					
Ho171	5.30E+01	3.14E-10					
Ho172	2.50E+01	1.69E-02					
Er149	1.07E+01	1.69E-02					
Er150	1.85E+01	1.40E+00					
Er151	2.35E+01	4.14E+00					
Er151*	5.80E-01	3.37E-02					
Er152	1.01E+01	1.83E+01					
Er153	3.71E+01	3.63E+01					
Er154	2.21E+02	9.60E+01					
Er155	3.18E+02	1.31E+02					
Er156	1.17E+03	2.26E+02					
Er157	1.12E+03	2.76E+02					

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _r (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Er158	8.10E+03	4.22E+02					
Er159	2.16E+03	4.39E+02					
Er160	1.03E+05	5.55E+02					
Er161	1.16E+04	5.93E+02	6.41E+03	9.26E-02	9.07E+01	1.64E-01	3.08E-04
Er163	4.50E+03	6.98E+02					
Er165	3.73E+04	7.95E+02	8.63E+04	9.21E-03	2.99E+01	4.11E-03	1.94E-05
Er167*	2.28E+00	3.84E+00					
Er169	8.12E+05	4.60E-01	1.73E+03	2.66E-04	2.09E+03	6.44E-06	3.93E-07
Er171	2.71E+04	5.14E-02	4.79E+03	1.07E-05	5.62E+02	6.59E-02	2.18E-08
Er172	1.77E+05	3.37E-02	8.24E+02	4.09E-05	4.11E+03	9.14E-02	6.58E-08
Er173	8.60E+01	1.02E-06					
Er174	1.92E+02	1.69E-02					
Er175	7.20E+01	1.69E-02					
Tm153	1.59E+00	5.17E-01					
Tm154	8.10E+00	3.66E+00					
Tm154*	3.30E+00	9.45E-01					
Tm155	3.40E+01	1.53E+01					
Tm156	8.38E+01	1.96E+01					
Tm156*	1.90E+01	2.57E+01					
Tm157	2.10E+02	1.22E+02					
Tm158	2.41E+02	2.10E+02					
Tm159	5.49E+02	3.03E+02					
Tm160	5.64E+02	2.97E+02					
Tm160*	7.45E+01	1.19E+02					
Tm161	2.28E+03	5.17E+02					
Tm162	1.30E+03	5.95E+02	3.67E+03	1.62E-01	2.19E+01	3.33E-01	5.90E-04
Tm163	6.52E+03	6.66E+02					
Tm164	1.20E+02	7.14E+02					
Tm164*	3.06E+02	4.43E+01					
Tm165	1.08E+05	7.85E+02					
Tm166	2.77E+04	8.74E+02	2.62E+03	3.33E-01	3.77E+02	3.46E-01	1.03E-03
Tm167	7.98E+05	9.37E+02	1.20E+03	7.84E-01	2.95E+03	2.24E-02	1.19E-03
Tm168	8.04E+06	1.17E+01					
Tm170	1.11E+07	1.32E+01	1.37E+02	9.62E-02	2.63E+04	8.25E-04	1.42E-04
Tm171	6.06E+07	9.37E-01	3.94E+02	2.38E-03	9.14E+03	7.96E-05	3.51E-06
Tm172	2.29E+05	1.17E+00	7.01E+02	1.67E-03	4.88E+03	8.92E-02	2.65E-06
Tm173	2.97E+04	4.73E-01	5.31E+03	8.91E-05	4.81E+02	6.85E-02	1.89E-07
Tm174	3.24E+02	3.88E-01					
Tm175	9.12E+02	2.19E-01	6.32E+03	3.47E-05	2.32E+01	1.90E-01	1.25E-07

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Tm176	1.11E+02	1.18E-01					
Yb154	4.02E-01	1.52E-01					
Yb155	1.71E+00	3.71E-01					
Yb156	2.61E+01	6.57E+00					
Yb157	3.86E+01	1.81E+01					
Yb158	9.90E+01	6.69E+01					
Yb159	8.40E+01	1.01E+02					
Yb160	2.88E+02	2.22E+02					
Yb161	2.52E+02	2.85E+02					
Yb162	1.13E+03	4.23E+02	4.36E+04	9.71E-03	2.23E+01	2.09E-02	3.00E-05
Yb163	6.63E+02	4.99E+02					
Yb164	4.55E+03	6.63E+02					
Yb165	5.94E+02	7.09E+02					
Yb166	2.04E+05	8.38E+02	1.20E+03	6.99E-01	2.97E+03	1.06E-02	1.05E-03
Yb167	1.05E+03	9.11E+02	2.89E+04	3.15E-02	8.36E+00	4.03E-02	1.12E-04
Yb169	2.77E+06	1.30E+03	4.39E+02	2.95E+00	8.07E+03	4.77E-02	4.47E-03
Yb169*	4.60E+01	7.35E+01					
Yb175	3.62E+05	4.08E+00	2.20E+03	1.86E-03	1.62E+03	6.92E-03	2.79E-06
Yb175*	6.82E-02	4.39E-01					
Yb176*	1.14E+01	1.19E-01					
Yb177	6.88E+03	1.35E+00	1.48E+04	9.15E-05	1.45E+02	3.42E-02	2.17E-07
Yb177*	6.41E+00	4.22E-01					
Yb178	4.44E+03	1.01E+00	2.00E+04	5.06E-05	1.62E+02	6.18E-03	8.58E-08
Yb179	4.80E+02	3.54E-01					
Yb180	1.44E+02	1.52E-01					
Lu157	5.40E+00	1.86E-01					
Lu158	1.04E+01	2.50E+00					
Lu159	1.23E+01	1.13E+01					
Lu160	3.55E+01	3.21E+01					
Lu161	7.20E+01	8.52E+01					
Lu161*	7.30E-03	5.09E+01					
Lu162	8.22E+01	1.08E+02					
Lu162*	1.14E+02	2.93E+01					
Lu163	2.38E+02	2.57E+02					
Lu164	1.88E+02	3.64E+02					
Lu165	6.44E+02	5.22E+02					
Lu166	1.59E+02	4.74E+02					
Lu166*	8.50E+01	1.33E+02					
Lu166#	1.27E+02	8.62E+01					

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Lu167	3.09E+03	7.99E+02					
Lu168	3.30E+02	7.77E+02					
Lu168*	4.02E+02	1.27E+02					
Lu169	1.23E+05	1.05E+03	1.91E+03	5.51E-01	1.35E+03	1.88E-01	1.16E-03
Lu169*	1.60E+02	2.49E+02					
Lu170	1.73E+05	1.22E+03	9.14E+02	1.34E+00	2.58E+03	4.74E-01	3.00E-03
Lu170*	6.70E-01	6.46E+01					
Lu171	7.12E+05	1.37E+03	1.08E+03	1.27E+00	2.99E+03	1.20E-01	2.17E-03
Lu171*	7.90E+01	3.72E+01					
Lu172	5.79E+05	6.48E+02	6.02E+02	1.08E+00	5.00E+03	3.42E-01	1.98E-03
Lu172*	2.20E+02	4.00E+01					
Lu172#	4.40E-04	3.31E+00					
Lu173	4.32E+07	8.99E+02	1.59E+02	5.64E+00	2.25E+04	1.89E-02	8.34E-03
Lu174	1.05E+08	2.01E+01	9.09E+01	2.22E-01	3.96E+04	2.02E-02	3.28E-04
Lu174*	1.23E+07	2.53E+01	1.42E+02	1.78E-01	2.54E+04	8.07E-03	2.63E-04
Lu176	1.14E+18	4.10E-10	5.44E+00	7.55E-11	6.62E+05	8.58E-02	1.11E-13
Lu176*	1.33E+04	3.73E+01	1.32E+04	2.83E-03	2.67E+02	2.17E-03	4.32E-06
Lu177	5.74E+05	3.36E+01	1.46E+03	2.30E-02	2.45E+03	5.99E-03	3.43E-05
Lu177*	1.39E+07	1.46E+00	4.88E+01	2.99E-02	7.33E+04	1.73E-01	4.45E-05
Lu178	1.70E+03	1.28E+01	2.95E+04	4.33E-04	4.66E+01	2.62E-02	1.23E-06
Lu178*	1.39E+03	8.27E+00	6.10E+03	1.36E-03	3.27E+01	1.94E-01	4.83E-06
Lu179	1.65E+04	1.70E+01	1.02E+04	1.67E-03	3.38E+02	5.62E-03	2.64E-06
Lu180	3.42E+02	9.08E+00					
Lu181	2.10E+02	6.16E+00					
Lu182	1.20E+02	2.18E+00					
Lu183	5.80E+01	1.28E+00					
Lu184	2.00E+01	1.18E-01					
Hf160	1.20E+01	1.18E-01					
Hf161	1.70E+01	4.22E-01					
Hf162	3.76E+01	9.82E+00					
Hf163	4.00E+01	2.27E+01					
Hf164	1.68E+02	6.91E+01					
Hf165	1.02E+02	1.19E+02					
Hf166	4.06E+02	2.49E+02					
Hf167	1.23E+02	3.32E+02					
Hf168	1.56E+03	5.35E+02					
Hf169	1.94E+02	6.71E+02					
Hf170	5.76E+04	9.59E+02	2.46E+03	3.90E-01	1.20E+03	9.32E-02	7.33E-04
Hf171	4.36E+04	1.14E+03					

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Hf172	5.90E+07	5.11E+02	3.45E+01	1.48E+01	1.04E+05	1.50E-02	2.19E-02
Hf173	8.64E+04	1.64E+03	5.34E+03	3.07E-01	4.77E+02	6.85E-02	6.52E-04
Hf174	6.31E+22	8.49E-13					
Hf175	6.05E+06	2.04E+03	6.81E+02	3.00E+00	5.11E+03	6.25E-02	4.65E-03
Hf177*	1.08E+00	4.91E+00					
Hf177#	3.08E+03	1.54E-01	2.99E+03	5.14E-05	7.44E+01	3.92E-01	1.83E-07
Hf178*	4.00E+00	2.56E+01					
Hf178#	9.78E+08	3.14E-02	5.43E+00	5.79E-03	6.62E+05	4.14E-01	8.56E-06
Hf179*	1.87E+01	1.16E+02					
Hf179#	2.17E+06	5.17E+00	3.41E+02	1.51E-02	1.01E+04	1.56E-01	2.38E-05
Hf180*	1.98E+04	1.14E+01	4.97E+03	2.29E-03	2.19E+02	1.75E-01	6.93E-06
Hf181	3.66E+06	1.05E+02	2.74E+02	3.82E-01	1.29E+04	9.69E-02	5.82E-04
Hf182	2.84E+14	8.14E-06	4.20E+00	1.94E-06	8.58E+05	4.22E-02	2.86E-09
Hf182*	3.69E+03	7.99E+00	6.95E+03	1.15E-03	4.59E+01	1.64E-01	4.01E-06
Hf183	3.84E+03	3.57E+01	7.22E+03	4.95E-03	1.12E+02	1.34E-01	1.58E-05
Hf184	1.48E+04	2.45E+01	3.69E+03	6.63E-03	8.55E+02	4.22E-02	1.16E-05
Hf185	2.10E+02	2.53E+00					
Hf186	1.56E+02	2.16E-08					
Hf187	4.78E+01	1.21E-12					
Ta161	2.70E+00	1.69E-02					
Ta162	3.52E+00	2.02E-01					
Ta163	1.10E+01	9.28E-01					
Ta164	1.36E+01	5.72E+00					
Ta165	3.10E+01	1.93E+01					
Ta166	3.44E+01	4.28E+01					
Ta167	8.40E+01	1.07E+02					
Ta168	1.46E+02	1.81E+02					
Ta169	2.94E+02	3.57E+02					
Ta170	4.06E+02	4.91E+02					
Ta171	1.40E+03	7.72E+02					
Ta172	2.21E+03	8.41E+02	4.16E+03	2.02E-01	5.66E+01	2.81E-01	7.16E-04
Ta173	1.13E+04	1.28E+03	5.88E+03	2.18E-01	3.20E+02	1.02E-01	5.54E-04
Ta174	4.25E+03	1.39E+03	9.38E+03	1.48E-01	6.73E+01	1.10E-01	4.90E-04
Ta175	3.78E+04	1.77E+03	4.16E+03	4.27E-01	3.81E+02	1.68E-01	1.16E-03
Ta176	2.91E+04	2.13E+03	2.21E+03	9.63E-01	4.66E+02	4.03E-01	2.94E-03
Ta177	2.04E+05	2.63E+03	1.08E+04	2.44E-01	3.07E+02	9.36E-03	4.03E-04
Ta178	5.59E+02	3.10E+03	7.33E+04	4.23E-02	0.00E+00	1.71E-02	1.56E-04
Ta178*	8.50E+03	3.24E+02	6.11E+03	5.30E-02	8.29E+01	1.76E-01	1.79E-04
Ta179	5.74E+07	1.81E+03	5.52E+02	3.27E+00	6.51E+03	4.03E-03	4.84E-03

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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ² /(Ci·s))	MEOI dose (rem)
Ta180	2.93E+04	7.21E+02	3.23E+04	2.23E-02	9.32E+01	6.33E-03	4.10E-05
Ta180*	3.79E+22	3.08E-13	1.47E+01	2.10E-14	2.45E+05	9.58E-02	3.10E-17
Ta182	9.89E+06	8.88E+02	7.93E+01	1.12E+01	4.48E+04	2.37E-01	1.69E-02
Ta182*	2.83E-01	4.34E+02					
Ta182#	9.50E+02	1.16E+02	2.73E+04	4.25E-03	1.34E+01	4.11E-02	1.47E-05
Ta183	4.41E+05	1.11E+03	6.72E+02	1.66E+00	5.22E+03	4.85E-02	2.54E-03
Ta184	3.13E+04	3.63E+02	1.82E+03	1.99E-01	1.14E+03	2.89E-01	4.79E-04
Ta185	2.96E+03	5.32E+02	2.03E+04	2.62E-02	8.40E+01	3.23E-02	6.90E-05
Ta186	6.30E+02	2.17E+01	4.35E+03	4.98E-03	2.43E+01	2.79E-01	1.80E-05
Ta187	6.73E+02	1.04E-04					
Ta188	1.48E+02	5.66E-08					
W 165	5.10E+00	5.06E-02					
W 166	1.60E+01	3.54E-01					
W 167	1.99E+01	1.76E+00					
W 168	5.30E+01	8.64E+00					
W 169	7.80E+01	2.15E+01					
W 170	2.40E+02	7.55E+01					
W 171	1.44E+02	1.11E+02					
W 172	4.00E+02	2.41E+02					
W 173	4.78E+02	4.19E+02					
W 174	1.76E+03	6.74E+02					
W 175	2.04E+03	8.14E+02					
W 176	8.30E+03	1.37E+03	1.99E+04	6.90E-02	1.07E+02	2.60E-02	1.65E-04
W 177	8.10E+03	1.63E+03	6.94E+03	2.35E-01	6.51E+01	1.58E-01	8.00E-04
W 178	1.87E+06	2.50E+03	1.31E+04	1.92E-01	2.71E+02	1.71E-03	2.90E-04
W 179	2.25E+03	3.22E+03	1.57E+05	2.06E-02	3.50E+00	6.77E-03	6.90E-05
W 179*	3.84E+02	9.73E+02					
W 181	1.05E+07	8.04E+03	2.17E+04	3.71E-01	1.51E+02	5.18E-03	6.21E-04
W 183*	5.20E+00	3.95E+04					
W 185	6.49E+06	2.35E+04	4.80E+03	4.90E+00	7.51E+02	1.99E-05	7.22E-03
W 185*	1.00E+02	1.53E+03					
W 187	8.54E+04	4.36E+04	4.18E+03	1.04E+01	6.18E+02	8.44E-02	2.19E-02
W 188	6.03E+06	1.95E-01	8.77E+02	2.22E-04	4.11E+03	3.34E-04	3.28E-07
W 189	6.96E+02	8.55E-06					
W 190	1.80E+03	1.48E-16					
W 191	9.53E+00	3.87E-14					
W 192	3.62E+01	6.04E-22					
W 193	1.28E+01	2.36E-23					
Re167	6.10E+00	3.37E-02					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target

Identification No.: CN-LANSCE-LFO-07-002

Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Re168	6.90E+00	2.02E-01					
Re169	1.29E+01	1.38E+00					
Re170	8.00E+00	3.88E+00					
Re171	1.52E+01	1.43E+01					
Re172	1.50E+01	1.78E+01					
Re172*	5.50E+01	8.57E+00					
Re173	1.19E+02	6.01E+01					
Re174	1.38E+02	8.59E+01					
Re175	3.48E+02	1.51E+02					
Re176	3.40E+02	1.83E+02					
Re177	8.40E+02	2.82E+02	1.08E+04	2.62E-02	1.87E+01	1.10E-01	9.34E-05
Re178	7.92E+02	2.79E+02	5.39E+03	5.18E-02	1.88E+01	2.25E-01	1.88E-04
Re179	1.17E+03	4.13E+02					
Re180	1.46E+02	3.98E+02	5.91E+03	6.74E-02	0.00E+00	2.12E-01	2.49E-04
Re181	7.20E+04	4.78E+02	3.49E+03	1.37E-01	6.44E+02	1.35E-01	3.16E-04
Re182	2.30E+05	1.57E+02	9.40E+02	1.67E-01	2.86E+03	3.39E-01	3.41E-04
Re182*	4.57E+04	1.62E+02	3.61E+03	4.49E-02	3.81E+02	2.14E-01	1.28E-04
Re183	6.05E+06	2.94E+02					
Re183*	1.04E-03	5.48E+00					
Re184	3.28E+06	1.25E+02	6.43E+02	1.94E-01	5.14E+03	1.59E-01	3.22E-04
Re184*	1.43E+07	2.83E+01	2.41E+02	1.17E-01	1.47E+04	6.73E-02	1.76E-04
Re186	3.26E+05	4.55E+02	1.12E+03	4.05E-01	3.20E+03	3.40E-03	6.01E-04
Re186*	6.31E+12	3.81E-05	9.97E+01	3.82E-07	3.61E+04	1.85E-03	5.64E-10
Re187	1.58E+18	8.48E-07	6.62E+04	1.28E-11	5.44E+01	0.00E+00	1.89E-14
Re188	6.12E+04	3.44E+02	1.76E+03	1.95E-01	2.01E+03	1.06E-02	2.95E-04
Re188*	1.12E+03	1.41E+01	4.92E+04	2.87E-04	4.11E+01	1.12E-02	7.03E-07
Re189	8.75E+04	3.68E-03	2.82E+03	1.31E-06	1.24E+03	1.19E-02	2.01E-09
Re190	1.86E+02	4.28E-08					
Re190*	1.15E+04	1.96E-08					
Re191	5.88E+02	3.98E-13					
Re192	1.60E+01	2.98E-08					
Re193	4.15E+02	1.83E-17					
Re194	7.08E+01	1.50E-16					
Re195	3.25E+00	3.62E-27					
Os171	8.00E+00	1.01E-01					
Os172	1.90E+01	3.37E-01					
Os173	1.60E+01	6.58E-01					
Os174	4.40E+01	1.47E+00					
Os175	8.40E+01	1.70E+00					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Os176	1.80E+02	2.82E+00					
Os177	1.68E+02	2.06E+00					
Os178	3.00E+02	2.80E+00					
Os179	3.90E+02	2.26E+00					
Os180	1.29E+03	1.94E+00	9.40E+04	2.06E-05	1.38E+01	8.51E-03	5.97E-08
Os181	1.62E+02	1.21E+00					
Os181*	6.30E+03	3.79E-07	4.69E+03	8.08E-11	1.34E+02	2.20E-01	2.67E-13
Os182	7.96E+04	6.92E-01	2.26E+03	3.06E-04	1.38E+03	7.44E-02	5.43E-07
Os183	4.68E+04	1.72E-01					
Os183*	3.56E+04	1.35E-01					
Os185	8.09E+06	5.49E-02	3.50E+02	1.57E-04	9.92E+03	1.27E-01	2.44E-07
Os186	6.00E+22	9.63E-14					
Os189*	1.73E+04	6.38E-01	1.21E+05	5.29E-06	2.99E+01	3.92E-07	7.80E-09
Os190*	5.94E+02	6.06E-07	4.45E+03	1.36E-10	0.00E+00	2.81E-01	5.02E-13
Os191	1.33E+06	5.17E-06	8.55E+02	6.05E-09	4.18E+03	1.19E-02	9.04E-12
Os191*	4.72E+04	5.59E-06	1.18E+04	4.75E-10	3.03E+02	1.02E-03	7.11E-13
Os192*	5.90E+00	9.64E-08					
Os193	1.08E+05	9.86E-12	1.77E+03	5.58E-15	2.00E+03	1.26E-02	8.45E-18
Os194	1.89E+08	3.17E-15	5.38E+00	5.89E-16	6.70E+05	1.02E-04	8.69E-19
Os195	3.90E+02	2.00E-17					
Os196	2.09E+03	8.11E-23					
Os197	1.55E+02	1.70E-25					
Os198	6.01E+02	3.33E-40					
Os199	1.07E+02	6.76E-42					
Ir181	2.94E+02	1.69E-02					
Ir183	3.30E+03	9.37E-31					
Ir184	1.09E+04	7.49E-26	2.97E+03	2.52E-29	2.11E+02	3.47E-01	8.32E-32
Ir185	5.00E+04	8.71E-24	4.18E+03	2.08E-27	5.48E+02	1.09E-01	4.75E-30
Ir186	5.99E+04	2.29E-18	2.04E+03	1.13E-21	9.10E+02	2.98E-01	2.87E-24
Ir186*	7.20E+03	4.47E-20	7.27E+03	6.16E-24	0.00E+00	1.72E-01	2.27E-26
Ir187	3.78E+04	1.02E-14	9.26E+03	1.10E-18	2.10E+02	6.22E-02	2.74E-21
Ir188	1.49E+05	3.19E-13	1.50E+03	2.12E-16	1.54E+03	2.96E-01	4.80E-19
Ir189	1.14E+06	7.02E-10	2.14E+03	3.28E-13	1.65E+03	1.19E-02	4.99E-16
Ir190	1.02E+06	3.11E-10	5.05E+02	6.16E-13	6.40E+03	2.54E-01	1.05E-15
Ir190*	4.32E+03	1.09E-09	1.18E+05	9.24E-15	3.05E+01	4.70E-07	1.36E-17
Ir190#	1.15E+04	5.89E-12	4.57E+03	1.29E-15	0.00E+00	2.73E-01	4.75E-18
Ir191*	4.94E+00	1.62E-05	1.12E+05	1.45E-10	0.00E+00	1.12E-02	5.35E-13
Ir191#	6.00E+00	6.33E-08					
Ir192	6.38E+06	2.95E-08	1.26E+02	2.34E-10	2.82E+04	1.45E-01	3.53E-13

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Ir192*	8.64E+01	1.49E-07					
Ir192#	7.60E+09	3.42E-12	9.36E+00	3.66E-13	3.85E+05	2.82E-02	5.40E-16
Ir193*	9.16E+05	6.30E-10					
Ir194	6.94E+04	5.12E-09	1.22E+03	4.19E-12	2.90E+03	1.68E-02	6.33E-15
Ir194*	1.48E+07	8.19E-11	5.17E+01	1.58E-12	6.85E+04	4.14E-01	2.39E-15
Ir195	9.00E+03	1.30E-12	2.20E+04	5.89E-17	1.39E+02	8.58E-03	1.07E-19
Ir195*	1.37E+04	1.30E-12	7.91E+03	1.65E-16	2.49E+02	7.14E-02	4.08E-19
Ir196	5.20E+01	4.41E-13					
Ir196*	5.04E+03	2.58E-13					
Ir197	3.48E+02	2.29E-19					
Ir197*	5.34E+02	1.86E-19					
Ir198	8.00E+00	2.46E-20					
Ir199	3.71E+02	3.27E-33					
Ir200	1.24E+02	1.62E-35					
Pt186	7.20E+03	3.50E-16	7.08E+03	4.95E-20	1.32E+02	1.31E-01	1.54E-22
Pt187	8.46E+03	1.87E-15					
Pt188	8.80E+05	2.03E-13	1.11E+03	1.82E-16	3.14E+03	3.28E-02	2.81E-19
Pt189	3.92E+04	4.69E-10	1.07E+04	4.39E-14	1.79E+02	5.48E-02	1.10E-16
Pt190	1.89E+19	2.63E-19					
Pt191	2.51E+05	4.08E-09	4.76E+03	8.58E-13	6.14E+02	4.96E-02	1.62E-15
Pt193	1.58E+09	4.03E-08	1.59E+04	2.54E-12	2.27E+02	1.47E-06	3.75E-15
Pt193*	3.74E+05	6.67E-09	4.09E+03	1.63E-12	8.77E+02	1.54E-03	2.43E-15
Pt195*	3.47E+05	2.04E-10	2.89E+03	7.05E-14	1.22E+03	1.05E-02	1.08E-16
Pt197	7.16E+04	9.45E-11	6.24E+03	1.51E-14	5.66E+02	3.74E-03	2.29E-17
Pt197*	5.66E+03	6.30E-12	2.26E+04	2.79E-16	1.22E+02	1.29E-02	5.56E-19
Pt199	1.85E+03	2.19E-17	2.41E+04	9.08E-22	4.55E+01	3.60E-02	2.73E-24
Pt199*	1.36E+01	1.73E-18					
Pt200	4.50E+04	1.33E-26	2.13E+03	6.27E-30	1.67E+03	9.44E-03	9.47E-33
Pt201	1.50E+02	1.06E-33					
Pt202	1.58E+05	2.02E-42					
Au190	2.57E+03	5.71E-31					
Au191	1.14E+04	1.49E-24					
Au191*	9.20E-01	1.27E-20					
Au192	1.78E+04	2.69E-19					
Au192*	2.90E-02	8.34E-23					
Au193	6.35E+04	1.06E-17	9.95E+03	1.06E-21	2.89E+02	2.53E-02	2.04E-24
Au193*	3.90E+00	6.35E-18					
Au194	1.42E+05	4.46E-17	2.27E+03	1.96E-20	1.02E+03	1.96E-01	4.44E-23
Au194*	6.00E-01	2.43E-17					

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
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nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _I (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Au194#	4.20E-01	2.32E-15					
Au195	1.61E+07	1.83E-13	2.77E+02	6.60E-16	1.30E+04	1.19E-02	9.77E-19
Au195*	3.05E+01	1.26E-13	3.61E+04	3.49E-18	0.00E+00	3.47E-02	1.29E-20
Au196	5.34E+05	1.26E-12					
Au196*	8.10E+00	2.95E-11					
Au196#	3.49E+04	4.65E-14					
Au197*	7.80E+00	2.52E-12					
Au198	2.33E+05	3.26E-11	1.03E+03	3.15E-14	3.28E+03	7.18E-02	5.06E-17
Au198*	1.99E+05	1.31E-13	7.02E+02	1.87E-16	4.85E+03	9.84E-02	2.99E-19
Au199	2.71E+05	1.27E-13	2.34E+03	5.45E-17	1.50E+03	1.51E-02	8.38E-20
Au200	2.90E+03	2.21E-18	1.60E+04	1.38E-22	7.88E+01	5.07E-02	4.03E-25
Au200*	6.73E+04	1.09E-20	1.10E+03	9.87E-24	2.19E+03	3.74E-01	2.17E-26
Au201	1.56E+03	2.88E-24	7.05E+04	4.08E-29	2.37E+01	9.51E-03	1.09E-31
Au202	2.88E+01	7.15E-22					
Au203	5.30E+01	2.22E-38					
Au204	3.98E+01	4.66E-40					
Hg191	2.90E+03	6.36E-26					
Hg192	1.75E+04	2.69E-19					
Hg193	1.37E+04	7.97E-19	1.60E+04	4.99E-23	1.33E+02	3.22E-02	1.19E-25
Hg193*	4.25E+04	6.07E-19	2.90E+03	2.09E-22	7.03E+02	1.87E-01	5.09E-25
Hg194	1.64E+10	6.22E-18	8.54E+01	7.28E-20	4.22E+04	2.56E-06	1.07E-22
Hg195	3.56E+04	3.34E-17	1.36E+04	2.45E-21	1.67E+02	3.40E-02	5.62E-24
Hg195*	1.50E+05	3.79E-17	2.24E+03	1.69E-20	1.50E+03	3.56E-02	2.73E-23
Hg197	2.31E+05	1.35E-14	5.03E+03	2.68E-18	6.88E+02	9.84E-03	4.19E-21
Hg197*	8.57E+04	3.98E-15	3.10E+03	1.28E-18	1.12E+03	1.50E-02	2.00E-21
Hg199*	2.56E+03	1.35E-15	2.99E+04	4.54E-20	3.15E+01	3.09E-02	1.41E-22
Hg203	4.03E+06	8.44E-32	6.15E+02	1.37E-34	5.74E+03	4.18E-02	2.09E-37
Hg205	3.12E+02	3.61E-39					
Hg206	4.89E+02	7.86E-52					
Hg207	1.74E+02	1.93E-61					
Hg208	2.52E+03	7.26E-62					
Hg209	3.70E+01	9.46E-68					
Tl197	1.02E+04	2.66E-55	1.41E+04	1.89E-59	4.96E+01	7.14E-02	6.15E-62
Tl197*	5.40E-01	1.79E-55					
Tl198	1.91E+04	1.09E-45	2.90E+03	3.74E-49	1.64E+02	3.74E-01	1.27E-51
Tl198*	6.73E+03	5.36E-46	5.05E+03	1.06E-49	1.07E+02	2.11E-01	3.56E-52
Tl199	2.67E+04	3.20E-40	1.90E+04	1.69E-44	6.96E+01	4.18E-02	4.86E-47
Tl200	9.40E+04	5.12E-39	3.12E+03	1.64E-42	4.70E+02	2.38E-01	4.57E-45
Tl201	2.62E+05	3.57E-34	1.31E+04	2.73E-38	2.35E+02	1.40E-02	4.91E-41

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Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF _i (rem/Ci)	DCF _s (rem·m ³ /(Ci·s))	MEOI dose (rem)
Tl202	1.06E+06	1.04E-33	2.96E+03	3.52E-37	9.84E+02	8.07E-02	6.68E-40
Tl204	1.19E+08	4.28E-34	1.50E+03	2.86E-37	2.41E+03	2.07E-04	4.22E-40
Tl206	2.52E+02	7.51E-42	5.02E+06	1.50E-48	0.00E+00	2.49E-04	5.52E-51
Tl206*	2.26E+02	4.57E-42					
Tl207	2.86E+02	4.19E-48	2.09E+06	2.01E-54	0.00E+00	5.99E-04	7.41E-57
Tl207*	1.33E+00	2.09E-48					
Tl208	1.83E+02	8.55E-49	1.91E+03	4.48E-52	0.00E+00	6.55E-01	1.65E-54
Tl209	1.30E+02	1.00E-57	3.31E+03	3.03E-61	0.00E+00	3.77E-01	1.12E-63
Tl210	7.80E+01	5.14E-62					
Pb198	8.60E+03	3.96E-50	1.22E+04	3.24E-54	7.70E+01	7.55E-02	1.01E-56
Pb199	5.40E+03	2.31E-49	4.23E+03	5.47E-53	7.29E+01	2.70E-01	1.91E-55
Pb199*	7.32E+02	1.05E-49					
Pb200	7.74E+04	2.31E-43	4.05E+03	5.70E-47	7.92E+02	3.40E-02	9.81E-50
Pb201	3.36E+04	5.18E-43	5.55E+03	9.34E-47	2.62E+02	1.34E-01	2.61E-49
Pb201*	6.12E+01	1.86E-43					
Pb202	1.66E+12	3.44E-43	3.67E+01	9.37E-45	9.81E+04	1.67E-06	1.38E-47
Pb202*	1.27E+04	2.50E-39	2.90E+03	8.63E-43	1.79E+02	3.69E-01	2.91E-45
Pb203	1.87E+05	4.03E-38	5.28E+03	7.65E-42	5.29E+02	5.33E-02	1.51E-44
Pb203*	6.30E+00	1.34E-38					
Pb203#	4.80E-01	4.86E-40					
Pb204	4.42E+24	9.71E-52					
Pb204*	4.01E+03	5.04E-38					
Pb205	4.80E+14	5.55E-46	9.18E+02	6.04E-49	3.92E+03	1.87E-06	8.91E-52
Pb207*	8.05E-01	2.72E-45					
Pb209	1.17E+04	7.85E-49	3.80E+04	2.07E-53	9.47E+01	3.00E-05	3.05E-56
Pb210	7.04E+08	2.30E-58	2.65E-01	8.67E-58	1.36E+07	2.09E-04	1.28E-60
Pb211	2.17E+03	5.26E-62	4.13E+02	1.27E-64	8.70E+03	9.21E-03	1.89E-67
Bi201	6.48E+03	7.90E-70	4.23E+03	1.87E-73	1.58E+02	2.41E-01	6.12E-76
Bi202	6.01E+03	3.57E-69	2.40E+03	1.49E-72	8.14E+01	4.92E-01	5.31E-75
Bi203	4.23E+04	6.10E-63	1.71E+03	3.57E-66	8.29E+02	4.44E-01	1.01E-68
Bi204	4.04E+04	4.66E-62					
Bi205	1.32E+06	1.56E-57	6.88E+02	2.26E-60	4.33E+03	3.14E-01	4.20E-63
Bi206	5.39E+05	1.15E-56	4.36E+02	2.63E-59	6.55E+03	5.96E-01	5.09E-62
Bi206*	7.80E-09	7.85E-51					
Bi207	1.02E+09	4.89E-55	1.73E+02	2.83E-57	2.00E+04	2.79E-01	4.41E-60
Bi207*	1.82E-04	3.43E-57					
Bi208	1.16E+13	1.85E-58					
Bi209	3.16E+26	4.80E-68					
Bi210	4.33E+05	1.30E-53	1.84E+01	7.09E-55	1.96E+05	1.22E-04	1.05E-57

Title: Bounding Radionuclide Inventory and Accident Consequence Calculations for the 1L Target	
Identification No.: CN-LANSCE-LFO-07-002	Revision Number: 0

nuclide	half-life (s)	activity (Ci)	threshold (Ci)	threshold ratio	DCF ₁ (rem/Ci)	DCF _S (rem·m ³ /(Ci·s))	MEOI dose (rem)
Bi210*	9.47E+13	5.63E-61					
Bi211	1.28E+02	7.28E-59	1.52E+05	4.78E-64	0.00E+00	8.21E-03	1.76E-66
Po204	1.27E+04	6.42E-69					
Po205	5.98E+03	4.61E-68	3.85E+03	1.20E-71	1.04E+02	2.89E-01	4.12E-74
Po206	7.60E+05	4.25E-63					
Po207	2.09E+04	4.23E-62	4.14E+03	1.02E-65	1.76E+02	2.41E-01	3.31E-68
Po207*	2.79E+00	7.05E-63					
Po208	9.15E+07	1.77E-59					
Po209	3.22E+09	2.47E-60					
Po210	1.20E+07	6.48E-54	4.20E-01	1.54E-53	8.58E+06	1.54E-06	2.28E-56
Po211	5.16E-01	3.09E-60	8.87E+05	3.48E-66	0.00E+00	1.41E-03	1.28E-68
Po211*	2.55E+01	3.54E-62					

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APPENDIX 2
GENERAL CHECKING CRITERIA SHEET

CALCULATION CHECKLIST	Yes	No	N/A	Comments
1. Are analytical methods appropriate?	☒	☐	☐	
2. Are assumptions appropriate?	☒	☐	☐	
3. Is the calculation complete?	☒	☐	☐	
4. Is the calculation mathematically accurate?	☒	☐	☐	
5. Do calculation parameters comply with design criteria/dimensions?	☒	☐	☐	
6. Were input data appropriate?	☒	☐	☐	
7. Does the calculation reference or list applicable assumptions and major equation sources?	☒	☐	☐	
COMPUTER CODE CHECKLIST	Yes	No	N/A	Comments
1. Was an applicable and valid computer program used?	☒	☐	☐	
2. Are the input assumptions appropriate?	☒	☐	☐	
3. Was the input entered correctly?	☒	☐	☐	
4. Do the input results seem reasonable?	☒	☐	☐	

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ADDITIONAL COMMENTS

Number	Comment	Resolution
151650	none	